THE EVALUATION OF TRAINING FOR EMPLOYED STAFF IN VOCATIONAL REHABILITATION FACILITIES

A Thesis

Presented to

The School of Graduate Studies

Drake University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

---

by

Barbara J. Bontrager

July 1984

THE EVALUATION OF TRAINING FOR EMPLOYED STAFF IN VOCATIONAL REHABILITATION FACILITIES

by

Barbara J. Bontrager

Approved by Committee:

W Scott Wood
Dr. W. Scott Wood, Chair

Margaret E Lloyd
Dr. Margaret E. Lloyd

Carl E Shawhan
Dr. Carl Shawhan

Earle L Canfield
Dr. Earle L. Canfield
Dean of the School of Graduate Studies

THE EVALUATION OF TRAINING FOR EMPLOYED STAFF IN VOCATIONAL REHABILITATION FACILITIES

An abstract of a Thesis by
Barbara J. Bontrager
July 1984
Drake University
Advisor: W. Scott Wood

The Problem. The evaluation of a multiple facility training package to teach behavior modification skills for staff in vocational rehabilitation settings. A time-efficient, cost-effective training package is important when training groups in wide geographical areas. A package consisting of instruction, written manual with knowledge testing, role playing with performance feedback, and checkout delivery system should increase trainer performance.

Procedure. A multiple baseline across experimental groups design was used to evaluate trainer performance during videotaped sessions, using a checklist rating form. The rating form identified training techniques addressed in an instructional package.

Findings. The training package was not effective in increasing Trainer Preparation behaviors. Subjects that made gains across conditions failed to maintain those levels of responding. The training package was effective in teaching Gaining Attention and Cueing and Graduated Guidance behaviors for some subjects. Prompting behaviors were variable across the experimental groups.

Conclusion. The training package produced gains in performance for some subjects and training behaviors. Personal data suggests that increases in trainer behaviors subsequent to training may be a function of education and/or experience in the field.

Recommendations. Clarification of the effects of the training package by further defining tasks trained and selection of clients for training would allow further investigation into methods of increasing those training effects. These methods might involve multi-media approaches addressing individuals with specific educational/experience levels.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Staff training is an area that has recently begun to receive attention from many disparate professions. The field of Applied Behavior Analysis has joined this research trend, and rightly so. Behavior analysts perform duties in mental health centers (Hollander, Plutchik, & Horner, 1973; Quilitch, 1975), schools, institutions (both public and private) for the mentally and physically handicapped (Panyon, Boozer, & Morris, 1970), and other settings too numerous to mention. In those settings there frequently is a need for staff training to improve skill deficits. Although most staff are able to teach tasks to clients using their own personal methods, a structured teaching method can be more effective (Wall, Zane, & Thvedt, 1980) and efficient in the training of behavior modification techniques. When dealing with large groups of clients these skills become extremely critical.

To assess whether changes in the performance of behavior modification skills have actually taken place after staff training has been conducted, there frequently is a follow-up assessment along with fulfillment of course objectives and testing procedures (Cornwall, 1978). Traditionally this post-training evaluation has taken the form of questionnaires and informal measures of skill performance. These evaluations may be both inaccurate and misleading.

The field of Applied Behavior Analysis has emphasized the need for evaluations of whether changes of applied importance have been achieved as a criterion for evaluating training packages. The emphasis is on determining whether behavior changes occur that have an effect on job performance. As Cornwall (1978) so aptly stated: "The 'bottom line' of performance measurement of training is the degree to which on-the-job performance matches the job needs--after the training."

Social validation has been promoted as the means for determining whether these applied changes have been effected (Kazdin, 1977). Social validation refers to assessing the social acceptability of treatment interventions (Minkin, Braukmann, Minkin, Timbers, Timbers, Fixsen, Phillips, & Wolf, 1976). There are multiple factors contributing to social acceptability. The first is the acceptability of the focus of the intervention, i.e. whether the behaviors selected are important to the individual selected for treatment. The second factor is the acceptability of treatment procedures, i.e. consumer satisfaction. The third factor is the importance of the behavior change.

In determining whether a specific staff training program has selected target behaviors that are important to the individual selected for treatment, the natural environment must be taken into consideration. One must consider the level of functioning of the clients in the setting and the

types of training programs the staff member will be responsible for to equip the staff member with skills that are directly applicable to the natural environment. When implementing staff training programs for use in multiple settings, general categories of trainer behaviors must be identified, with adaptations for each facility. In general, important behaviors for individuals working with the mentally handicapped include: Trainer preparation, gaining attention and cueing, consequating, prompting, graduated guidance, and post-session behaviors (Gardner, Brust, & Watson, 1970; Schreibman, O'Neil, & Koegel, 1983; Sulzer-Azaroff & Mayer, 1977; Lowther, Martin, & McDonald, 1971; Lowther, Martin, & McDonald, 1972). Gaining attention and cueing, prompting, and graduated guidance are the categories of trainer behaviors that are applicable to the settings and addressed in the training materials that were the focus of this study.

Consumer satisfaction of treatment interventions has become a primary concern in recent years. Rights of individuals undergoing treatment, informed consent, and other ethical and legal issues have become important in determining the acceptability of treatment (Martin, 1975; Stolz & Associates, 1978; Plaska, Burgess, & Tillema, 1979). In the area of staff training the traditional approach to determining consumer satisfaction has been through written questionnaires similar to the feedback sheets used by Cornwall (1978).

Questions such as the adequacy of teaching aids and the applicability of techniques for an individual staff member's position are typically presented using a Likert scale or questionnaire, after training has been completed. Any staff training program should address the issue of consumer satisfaction, especially when participation in training is a requirement for job security.

The importance of behavior change is evaluated by comparing the behavior change with existing norms or through global evaluations conducted by those that interact closely with the individual in the natural environment or those who due to expertise, are qualified to rate that behavior. Global evaluations are overall assessments of an individual's total performance rather than assessment of specific target behaviors.

Minkin et al. (1976) used a combination of global and behavioral rating methods to assess the effects of treatment intervention, procedures to develop conversational skills. Specific component behaviors were targeted and videotapes of conversations were viewed. Moderate to high correlations were obtained between global rating and behavioral observations of specific component behaviors.

Davis, Trace, and Bontrager (1981) investigated the efficacy of three assessment tools in evaluating the staff performance of training techniques. The first tool consisted of a list of training behaviors in a trial-by-trial rating

scale. The second consisted of a checklist scale and the third was a global evaluation scale. The authors identified six skill areas as having importance when training in the field of Behavior Analysis. The skill areas included: trainer preparation, gaining attention and cueing, prompting hierarchy, graduated guidance, consequating behaviors, and post-session behaviors. Each of these skill areas were further divided into discrete training behaviors. The rating scales evaluated the above training behaviors, with the trial-by-trial scale being the most sensitive and the global rating scale being the least sensitive. The correlation between the trial-by-trial and checklist rating scales was high, with a Rho of .980. Correlations of the global ratings to the other two measures were poor. The authors evaluated each rating scale on the basis of two criteria: sensitivity and reliability of observations, and ease of administration. Because the checklist rating scale highly correlated with the more time-consuming and complex trial-by-trial rating scale, the authors indicated that the checklist rating scale was the tool of choice.

When concerned with the social validation of staff training, the normative level may not be an appropriate criterion for assessing the effects of intervention. In fact, the purpose of staff training should be to change the normative level, rather than maintain it. Normative levels should be used to assess the minimal behavior change that is

acceptable; a starting point only.

Typically, staff training programs have incorporated a mixed bag of techniques composed of classroom instruction (usually in the form of workshops), role playing, feedback and demonstration (Gardner, 1972; Gardner et al., 1970; Hollander et al., 1973; Quilitch, 1975). None of these techniques produce the desired behavior changes separate from the others but produce increases in behavior when used in a packaged form. Research has shown that classroom instruction serves to increase knowledge but does not necessarily produce changes in trainer behaviors (Braukmann, Fixsen, Kirigen, Phillips, Phillips, & Wolf, 1975; Quilitch, 1975). Progression through instructional materials does not ensure a high level of skill in applying behavior modification techniques (Lowther et al., 1971), just as practical training does not ensure knowledge of behavior modification principles (Gardner, 1972). As an adjunct, Lowther et al. (1971) reported that when trainer skill level was recorded as being high, the session was also successful in terms of client performance.

Feedback is most often cited as the primary component of the training package. This feedback has been delivered using both videotaped and written delivery systems, along with corrective and informational only formats (Panyon et al., 1970; Panyon & Patterson, 1974). Bricker, Morgan, and Grabowski (1972) used a combination of verbal and videotaped

feedback in conjunction with a token reinforcement (stamps) program to increase the quantity and quality of staff interactions with mentally handicapped children.

Quilitch (1975) compared three procedures to increase staff performance. These procedures consisted of written memos, a workshop, and performance feedback posted daily. The daily posted performance feedback increased staff performance of trainer behaviors while the memo and workshop produced little or no change in the interactions. Assuming that staff have knowledge of behavior modification training techniques, performance feedback may serve to increase performance of those techniques.

When implementing staff training programs for multiple facilities, across a wide geographical area, the delivery system becomes an important consideration. Primary concerns that must be dealt with involve cost-effectiveness and time-effectiveness. Cost-effectiveness becomes important when assessing travel expenses, the number of instructor hours involved, and the number of staff hours involved. Time-effectiveness involves wise use of instructor time, both in travel and instruction, to achieve the same objectives--trained staff.

Very little research has addressed delivery systems in multiple facility staff training. O'Dell, Krug, O'Quinn, and Kasnetz (1980) conducted one of few studies addressing this issue. The study compared five delivery systems for

teaching time-out skills to parents: Written manual, written manual plus brief individual checkout, audiotape, audiotape plus brief individual checkout, film, film plus individual checkout and individual modeling and rehearsal with a skilled trainer. The findings indicate that a combination of media training with individual checkout assists in the acquisition of skills and appears to be the most cost-effective method. The authors recommended the use of the audiotape plus brief individual checkout rather than written materials, because of its cost-effectiveness.

The goal of this study is to evaluate a training package designed to produce increases in the performance of behavior modification techniques, is cost-effective, and can be reproduced for ongoing staff training. The study is designed to assess the effects of a training package using instruction, written manual with knowledge testing, role playing with performance feedback (written and verbal), and a checkout delivery system on the performance of behavior modification skills.

CHAPTER II

METHOD

Subjects

Eleven direct-care staff members within three vocational/residential rehabilitation facilities for adult developmentally disabled clients served as subjects. The subjects were enrolled in one of two courses under a program for training employed staff in vocational rehabilitation facilities. Seven of the subjects were enrolled in a behavior management course (Teaching New Behaviors) and four were enrolled in a knowledge course (Exceptionalities) that did not focus on job-related skills but was designed for informational purposes only. The subjects were included in the study on a voluntary basis and not as a requirement for program completion or job security. The subjects ages ranged from 24 to 62 years, with two male and nine female subjects. The educational level of the subjects ranged from 12 to 18 years, with the range of employment within human service facilities from six months to 11½ years.

Setting

Videotaped evaluations were conducted within the facility of each subject and separate from classroom instruction. The experimenter conducting the videotaping sessions did not serve as the classroom instructor, thus was unaware of each subject's academic standing within the class. The skill rating form used in evaluating trainer behavior

was introduced prior to the videotaping, within the two experimental groups classroom. The rating form was introduced as a method of evaluating a hands-on exercise rather than the method used in evaluating the videotaped training sessions.

Procedure

Experimental design. Evaluation of staff-training was conducted utilizing a multiple baseline design across experimental groups (Baer, Wolf, & Risley, 1968; Campbell & Stanley, 1963). To assess the effects of the instructional package, eleven subjects from three vocational facilities comprised the two experimental and one control group. Group 1 consisted of five subjects, group 2 contained two subjects and group 3 (control group) consisted of four subjects. Groups 1 and 2 were provided with an identical training package. There was a two week delay between the onset of training for Group 1 and the onset of training for Group 2. Group 3 (control group) received a knowledge course (Exceptionalities). The onset of the knowledge course for the control group coincided with the onset of training for Group 1. Each subject selected one client to participate in training sessions for all three of the videotaped evaluations, whenever possible. Each client was chosen on the basis of demonstrating the prerequisite behaviors for one of the four tasks utilized for trainer evaluation purposes. (See Appendix A.) The client training programs were

packaged programs written by the experimenter and modified by the individual subject according to the client's physical impairments. The packaged programs were not utilized outside of the videotaping sessions. Program tasks included packaging bolts, assembling nuts and bolts, sweeping dirt into a dustpan, and trimming nails. Each program consisted of ten trials, with the videotaping session limited to ten trials or ten minutes.

The packaged programs eliminated the confounding variable of expertise in writing intervention programs for the developmentally disabled, which the target module within the course did not address.

Thirty minutes prior to the videotaping session, each subject selected a packaged program and obtained a data sheet and consent forms (if consent had not previously been established). This period of time was used to review the packaged program. At the designated time the subject and client met with the experimenter and conducted the training session. Each videotaped training session was conducted in a room separate from the main work area to minimize distractions. If the subject addressed a question to the experimenter regarding the data sheet or the packaged program, the experimenter pointed to the written information on the forms with a minimal amount of verbal interaction.

The three videotaped evaluation sessions were conducted two to three weeks apart, for the three groups. In addition,

the post-intervention evaluations for group one and group two were conducted within one week after the Teaching New Behavior module had been completed within the classroom.

A simple questionnaire was developed to verify consumer satisfaction or dissatisfaction with the course. The questionnaire addressed issues such as whether the course fulfilled expectations, effects of the course on job performance, possible improvements that could be made in the course as well as the delivery system, and course relevance to the subjects work setting.

Dependent Variable. The dependent variable, subject performance of behavior modification skills, was assessed using a checklist rating form (Davis et al., 1981). (See Appendix B.) The checklist rating form was composed of six skill areas: Trainer Preparation, Gaining Attention and Cueing, Prompting Hierarchy, Graduated Guidance, Consequating Behaviors, and Post-Session Behaviors. Because the training module did not address consequating and post-session behaviors in depth, these skill areas were not evaluated but remained on the checklist for future study. The training module did not address trainer preparation behaviors specifically; this skill area was evaluated for comparison purposes only. Each skill area was further subdivided into multiple component responses.

Dependent Variable Recording. Subject responses were recorded on videotape over three separate sessions. The

first videotaping for all three groups was conducted prior to the introduction of the Teaching New Behavior module for group 1 (the fourth week of instruction). The second videotaping session for all three groups was conducted one week after the conclusion of the Teaching New Behavior module for group 1 (week seven). The final videotaped evaluation session was conducted within week ten (one week following the conclusion of the Teaching New Behavior module for group 2).

Throughout the evaluation session, two sets of subject skill responses occurred, correct and incorrect responses. For example, when a subject presented a verbal prompt, depending upon the client's response or lack of response, the subject correctly or incorrectly emitted a component response of the prompting hierarchy.

The checklist rating scale utilized a Yes/No format. A skill component response was recorded as occurring (Yes) when greater than 50% of the opportunities to respond throughout the session were correctly responded to.

This raw data was then numerically summarized by calculating a percent occurrence score. The percent occurrence score was obtained by calculating the following formula: #component responses marked "Yes" / total number of applicable component responses. (Some component responses were not applicable to a specific training session.) Each skill category was numerically summarized independently.

Reliability: Reliability measures of skill performance

were recorded for one subject/videotaped training session per group, for each experimental condition (25% of total videotaped sessions). There were two primary observers. Each observer was selected on the basis of knowledge of behavior modification techniques. The primary observers also served as reliability observers by rating randomly selected training sessions independent of each other. Prior to observation of the training sessions each observer was given a handbook (see Appendix C) to read and was subsequently tested using an observer training videotape. The observers were naive as to the experimental group of the subject, and whether the training session was a reliability session. Reliability was calculated for the checklist rating form by using the following formula (Birkimer & Brown, 1979):

$$100 \times \left(\frac{\text{Disagreements on Occurrence}}{\text{Agreements on Occurrences + Disagreements}} \right)$$

The checklist rating scale using the Yes/No format, computed reliability using the Scored-Interval (S-I) method. A disagreement was scored when a discrepancy was seen between two observers on the occurrence of a specific component skill across the training session.

Independent Variable. The instructional module Teaching New Behavior served as the independent variable. (See Appendix D.) This instructional package focused on behavior change techniques such as shaping, chaining, fading,

generalization training, and discrimination training. In addition, there is an emphasis on coordinating the previous techniques to produce a cohesive training session. This particular training module was selected as the target module because of its focus on teaching behavior modification skills utilized in vocational rehabilitation settings. Along with the knowledge portion of the course, role playing with instructor feedback and practical training with instructor feedback (written and verbal) were incorporated as part of the training package.

CHAPTER III

RESULTS

Reliability

Reliability measures on subject skill performance ranged from 74% to 95%, with a mean of 87%. In part due to the videotaping of sessions for recording purposes, rather than on-site recording, interobserver reliability was high.

Trainer Preparation

Figure 1 shows the mean percent correct trainer preparation responses for the three groups. The results were variable. Those few subjects that increased trainer preparation responses did not maintain those increases over time. As this category of trainer responses was not addressed in the classroom or the training manual and given cursory attention in the instructional supplement, it eliminates the question of increases in behavior due to attention. The structure of the videotaped evaluation sessions prevented the occurrence of four out of five trainer preparation responses, as specified on the checklist rating scale. Because of this, the selection of appropriate reinforcers was the only component response scored within this skill area. Thus, possible levels of responding were 0% and 100%.

Group 1. The baseline rate for all group 1 subjects was 0%. The mean percent correct responding for two subjects remained at 0% for both post-intervention measures. Three subjects correct responses increased to 100% at the first

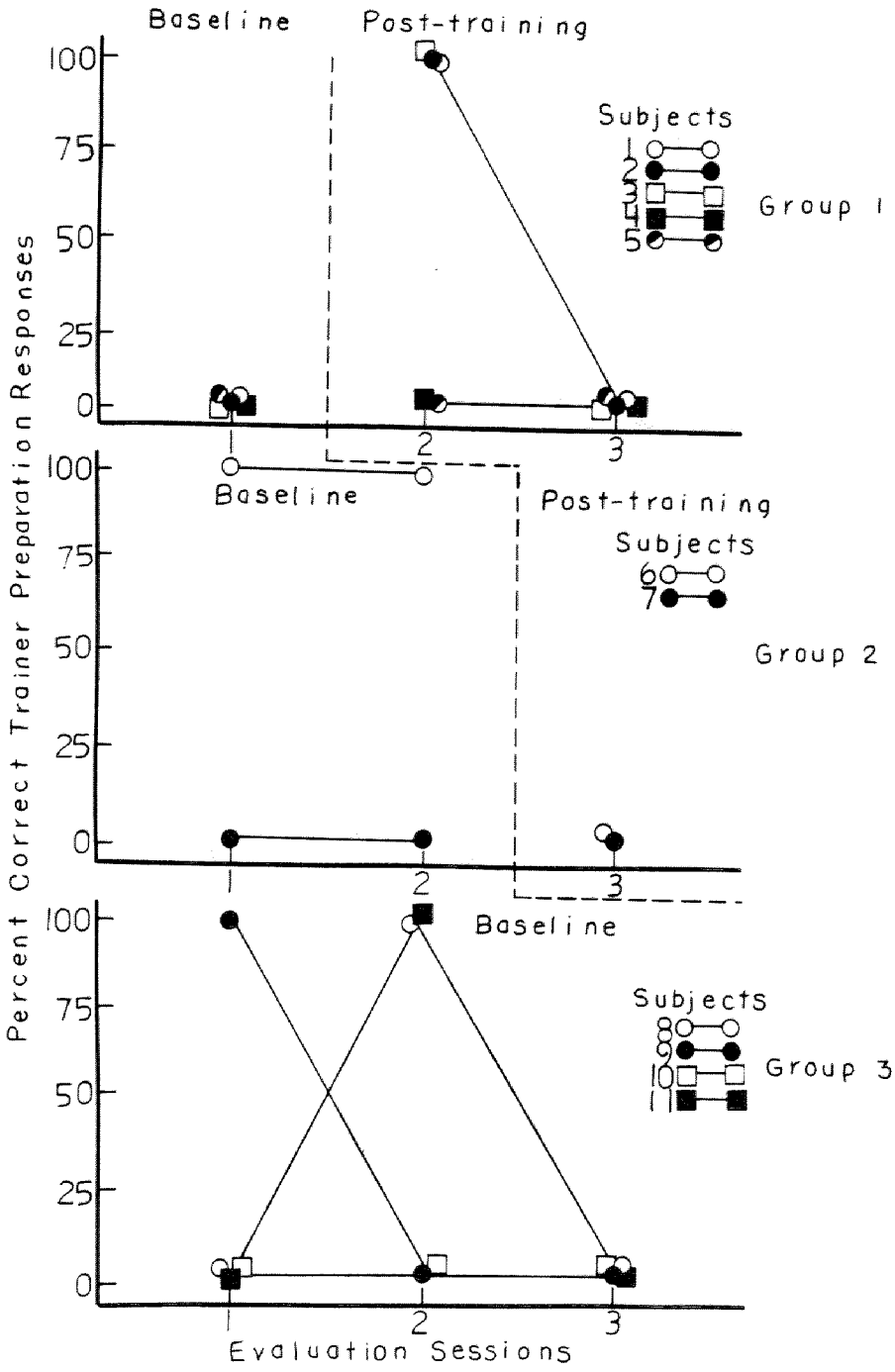


Figure 1. Percent correct trainer preparation responses, pre- and post-training.

post-intervention measure and subsequently decreased to 0% at the second post-intervention measure. All subjects trainer preparation responses were 0% at the second post-intervention measure.

Group 2. Subject 6 responded at 0% across all conditions. Subject 7 responded at 100% for the first two conditions and 0% at the second post-intervention measure.

Group 3. Results were mixed within the control group. Levels of responding for the first measure were 0% for three subjects and 100% for the remaining subject. The subject that responded at 100% for the first measure subsequently decreased to 0% for the second and third measures. Two subjects increased the percent of correct responding to 100% at the second measure. All subjects level of correct responding was 0% at the third measure.

Gaining Attention and Cueing

Figure 2 shows the mean percent correct gaining attention and cueing responses for the three subject groups. All subjects mean correct responding increased across the three conditions, although the gains made by subjects in group 1 were seen at the second post-intervention measure.

Group 1. The mean percent correct responding for group 1 ranged from 0% to 50% for the baseline measure. The first post-intervention measure ranged from 25% to 50% with the second post-intervention measure at 75% for all subjects. All subjects level of correct responding increased from

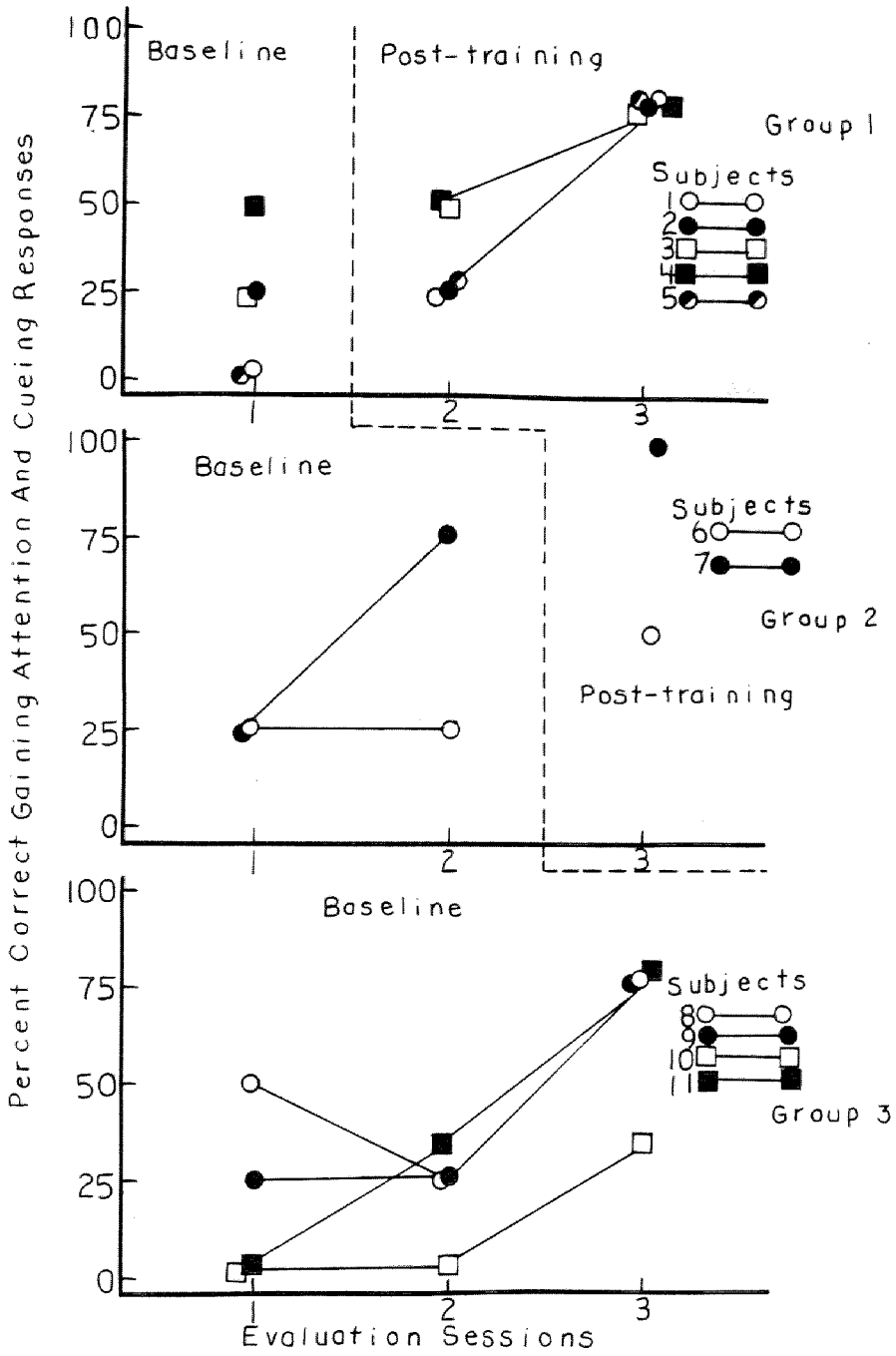


Figure 2. Percent correct graining attention and cueing responses, pre- and post-training.

baseline to the second post-intervention measure.

Group 2. There was an increase in responding from baseline to treatment conditions for Subject 6. Subject 7 responded at 25% for the first baseline measure, with a decrease to 20% at the second baseline measure, and an increase to 50% at the post-intervention measure.

Group 3. The mean percent correct responses for the first measure ranged from 0% to 50%, with Subject 8 responding at 50%, Subject 9 responding at 25% and Subjects 10 and 11 responding at 0%. Correct responding for measure two ranged from 25% to 33%, with Subject 8 showing a decrease in responding at 25% and Subjects 9 and 10 responding at the same level. Subject 11 increased from 0% to 33%. All subjects increased their level of responding at measure three.

Prompting

It should be noted that opportunities for prompting responses varied across the clients which were used for the videotaping of trainers. In many instances, trainers could not be evaluated in one or more conditions because of a lack of opportunities to emit a trainer response. Due to this problem, prompting responses are not presented in graph form. No clearcut trend was evident.

Group 1. No data were obtained for Subjects 1, 2, 3, and 5 for the baseline measure. Subject 4 performed 66% correct trainer responses. Responding for the first

post-intervention measure ranged from 50% to 100%, with Subject 1 responding at 100% and Subject 3 responding at 66%. Subject 4 decreased from 66% to 50% from baseline to the first post-intervention measure. Responding ranged from 66% to 100% for the second post-intervention measure. The percent of responding for Subjects 1, 2, and 4 was 83%, 100%, and 100%. Subject 3 remained at the 66% level. No data were obtained for Subject 5 for the second post-intervention measure.

Group 2. No data were obtained for Subject 6 for prompting responses. Subject 7 responded at 100% for the first baseline measure and decreased to 50% at the second baseline measure and the post-intervention measure.

Group 3. Mean percent correct prompting responses for the first baseline measure ranged from 0% to 50%, with Subjects 8 and 9 responding at 50% and Subjects 10 and 11 responding at 0%. At the second baseline measure there was an increase in correct responding for Subjects 9, 10, and 11. Responding ranged from 50% to 88%. Subject 8 responded at the 50% level across all three measures. Subject 9 increased from 50% to 88% at the second baseline measure, with Subject 10 at 50% and Subject 11 at 83% correct trainer responses. The range for the third baseline measure was 50% to 100%, with no data obtained for Subject 10. Subject 9 showed a decrease and Subject 11 increased the level of correct responding from the second baseline measure to the

third baseline measure.

Graduated Guidance

Figure 3 shows the mean percent correct graduated guidance responses for the three experimental groups. All subjects in group 1 increased their performance of graduated guidance skills after training. Both subjects in group 2 decreased their performance responses after training and three out of four control group subjects decreased their level of responding across time. The remaining subject in group 3 showed an increasing trend over time.

Group 1. All subjects in group 1 responded at the 0% correct level for the baseline measure. Responding for the first post-intervention measure ranged from 25% to 75%. All subjects showed an increase in correct responding across experimental conditions. Responding at the second post-intervention measure ranged from 50% to 80%, with an increase for four out of five subjects from the first post-intervention measure.

Group 2. The data from group 2 were variable across all three conditions, although all subjects were consistent in the trends shown. There was an increase from the first to the second pre-intervention measure, with a resulting decrease in the post-intervention measure.

Group 3. The results for the control group were variable. The range for the first baseline measure was 0% to 100%. The second baseline measure ranged from 25% to 75%. Two of

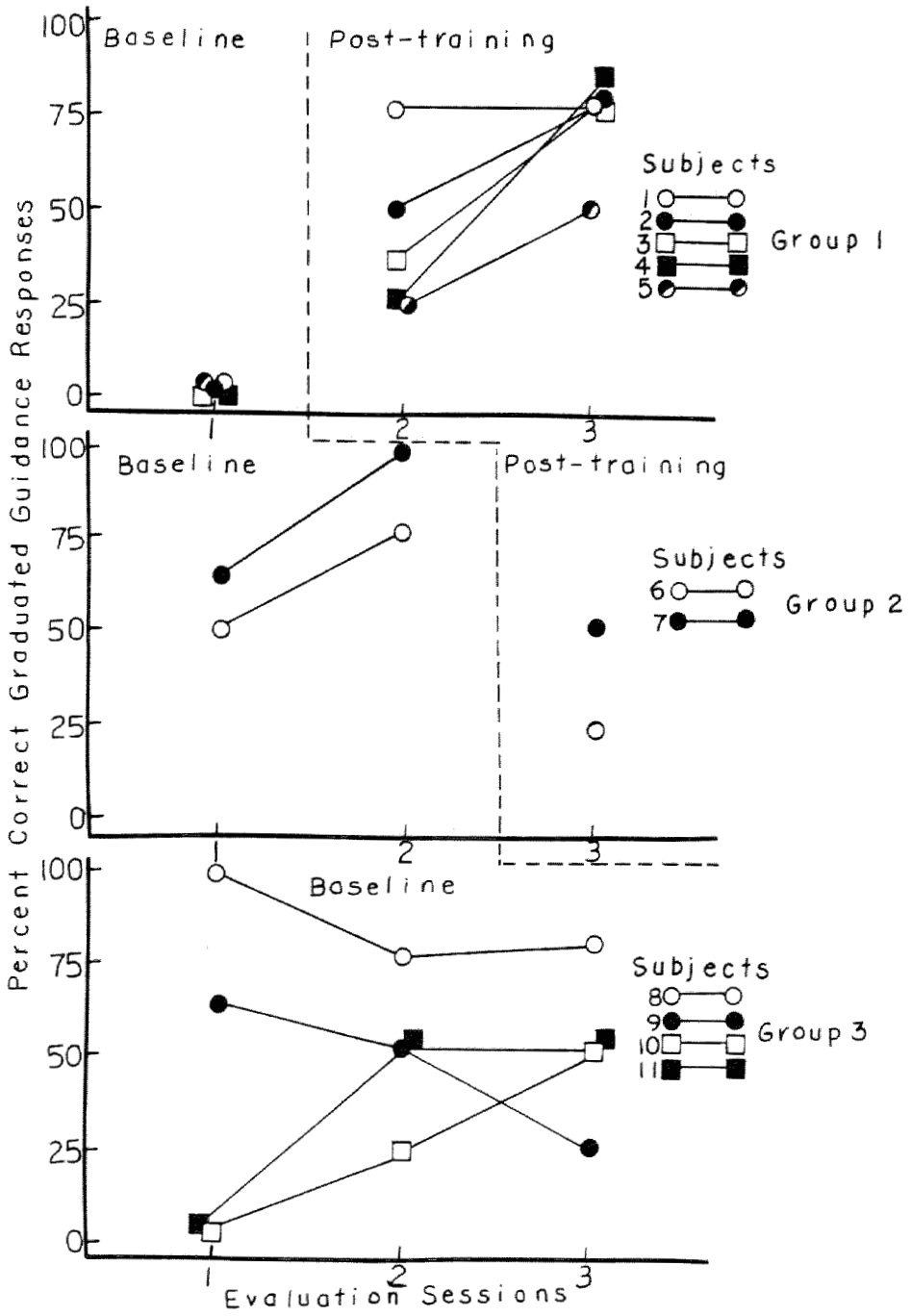


Figure 3. Percent correct graduated guidance responses, pre- and post-training.

the four subjects increased in the percent occurrence of the targeted behaviors over the first baseline measure, with the remaining two subjects percent of responding showing a decrease from the first to the second baseline measure. The percent of responding in the third baseline measure ranged from 20% to 80%. The majority of subjects showed a further increase or decrease in this condition, relative to the second baseline measure.

Consumer Satisfaction

A simple questionnaire was administered to all of the subjects during the final class session, to assess consumer satisfaction. A majority of the experimental subjects indicated that the Teaching New Behaviors course was directly applicable to their work setting. All of the subjects in group 1 indicated that they felt the training affected their work performance although most subjects were unable to specify the type of impact. The control group subjects indicated that the course (Exceptionalities) was relevant to their job but did not affect their job performance. One subject in group 2 felt that the course did not affect job performance although it was relevant. A second subject in group 2 indicated that job performance was affected, although a minimal amount. The 11 subjects were split in their thinking on whether the course was what they expected it to be.

In examining individual subjects data and in comparison

to both experience in the field and educational level, a trend becomes obvious. Those individuals having less educational training and/or experience in the field consistently performed less correct trainer behaviors than others having more experience or education, even subsequent to the course completion. This effect was consistent across experimental conditions and within the three subject groups (see Table 1).

Table 1

Subject Demographics and Performance Measures

Subject	Years of Field Experience	Years of Education	Post-training Performance Measures	Change in Performance with Training	Control Group Change in Performance Across Conditions
1	10.00	16	.733	+.733	--
2	10.00	18	.500	+.357	--
3	11.50	14	.563	+.420	--
4	3.50	16	.400	-.062	--
5	0.83	16	.333	+.333	--
6	1.00	13	.375	-.063	--
7	1.00	12	.667	-.208	--
8	9.00	16	--	--	+.054
9	5.00	16	--	--	.000
10	1.00	12	--	--	+.444
11	0.50	12	--	--	+.733

CHAPTER IV

DISCUSSION

The results of this study indicate that the Teaching New Behavior training module with the instructor plus checkout delivery system was effective for most subjects in teaching Gaining Attention and Cueing and Graduated Guidance behaviors. Although all three groups increased in the performance of Gaining Attention and Cueing behaviors across the three measures, the most gains were made by the two experimental groups. It is unclear whether the training produced the increase in group 1, as the gains were made at the second post-intervention measure. Due to a problem in obtaining pre-intervention data on Prompting behaviors, it is unclear whether the training program increased the performance of these behaviors.

The effect of education and/or experience on the subsequent performance of trainer behaviors warrants further investigation. Research into this effect might involve packaging the training program to allow for the repetition of concepts and techniques through a multi-media approach, to enhance the performance of individuals with less experience and/or education. Along with written materials and lecture, hand-outs explaining concepts in simple terms to be integrated into the work setting, plus diagrams and audio-tapes reiterating the same concepts, the retention rate and generalization to the work setting could be enhanced.

Another training strategy might involve a separation of each aspect of the multi-media approach over a period of time. This technique would allow students to digest small bits of compounding information over time, rather than attempting to incorporate many concepts simultaneously. For example, the initial presentation, possibly a lecture by the instructor, could be followed one week later by an audio tape session, then a series of hand-outs designed to be incorporated into the work setting. It is proposed that this format would allow those less familiar with the techniques to retain more of the information for longer periods of time.

An increasingly common method of evaluating the performance of trainer skills is evaluating the performance of the trainee. Peers, parents, and siblings have comprised the population of trainers in recent studies (Schreibman et al., 1983). The intended benefit of practical training programs is to produce long term change in the environment. In many instances, those subjects that increased the performance of trainer behaviors in the first post-intervention phase, failed to maintain the same level of skill in the second post-intervention phase. An examination of maintenance and generalization effects using trainee behaviors as the data base would be a time-efficient method of evaluation.

A problem inherent in the evaluation method utilized to

assess trainer behaviors was the selection of tasks analyzed within the videotaping sessions and the selection of clients trained within each session. The experimenter allowed each subject to select a client for training/videotaping purposes, based on the demonstration of prerequisite behaviors for one of four tasks. In some cases, the subjects failed to accurately assess the skill levels of the clients. This became evident when viewing the videotapes of the training sessions. Some trainees required very little assistance to complete the selected task, thus these training sessions produced few opportunities to prompt or use graduated guidance techniques. Because of this procedural problem, it was not possible to evaluate prompting behaviors for many subjects and graduated guidance behaviors for a few subjects.

The checklist rating scale was selected to assess trainer behaviors because of its ease of administration while maintaining a high degree of reliability and sensitivity. This scale does not weight the number of opportunities to respond. When few opportunities to prompt were presented, a correct or incorrect response may have grossly inflated or deflated the skill performance score. A greater variety of difficult tasks and/or a client population comprised of relatively low functioning clients would minimize this effect.

A systematic evaluation of a multi-media approach, the effects of the order and time of presentation on

generalization and maintenance effects may prove valuable in determining a cost-effective and time-efficient delivery system for facilities in a wide geographical area. Prior to the investigation of the delivery system itself, the procedures used within the videotaped evaluation sessions must be clearly delineated to produce a more accurate and informative evaluation of the Teaching New Behaviors instructional package.

References

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. Journal of Applied Behavior Analysis, 1, 91-97.

Birkimer, J., & Brown, J. (1979). A graphical judgmental aid which summarizes obtained and chance reliability data and helps assess the believability of experimental effects. Journal of Applied Behavior Analysis, 12, 523-543.

Braukmann, C., Fixsen, D., Kirigen, K., Phillips, E. A., Phillips, E. L., & Wolf, M. (1975). Achievement Place: The training and certification of teaching parents. In W. S. Wood (Ed.), Issues in evaluating behavior modification. Champaign, IL: Research Press.

Bricker, W., Morgan, D., & Grabowski, J. (1972). Development and maintenance of a behavior modification repertoire of cottage attendants through T.V. feedback. American Journal of Mental Deficiency, 77, 128-136.

Campbell, D. T., & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research. Chicago, IL: Rand McNally.

Cornwall, J. B. (1978). In your next class try this alternative to happy sheets. Training.

Davis, M., Trace, M., & Bontrager, B. (1981, May). The effects of training on staff performance. Paper

presented at the 6th annual convention of the Association for Behavior Analysis, Milwaukee, WI.

Gardner, J. M. (1972). Teaching behavior modification to nonprofessionals. Journal of Applied Behavior Analysis, 5, 517-521.

Gardner, J. M., Brust, D. J., & Watson, L. S. (1970). A scale to measure skill in applying behavior modification techniques to the mentally retarded. American Journal of Mental Deficiency, 74, 633-636.

Hollander, M., Plutchnik, R., & Horner, V. (1973). Interactions of patient and attendant reinforcement programs: The "piggyback" effect. Journal of Consulting and Clinical Psychology, 41, 43-47.

Kazdin, A. (1977). Assessing the clinical or applied importance of behavior change through social validation. Behavior Modification, 1, 427-452.

Lowther, R., Martin, G., & McDonald, L. (1971, June). A behavioral checklist for assessing staff behavior modification skills in an operant program with severe retardates. Paper presented at the 32nd annual convention of the Canadian Psychological Association, St. Johns, Newfoundland.

Lowther, R., Martin, G., & McDonald, L. (1972). Behavioral assessment of staff behavior modification skills. The Manitoba School for Retardates. Prepared and supported by Medical Research Council Grant No. MA 3636.

Martin, R. (1975). Legal challenges to behavior modification. Champaign, IL: Research Press.

Minkin, N., Braukmann, C. J., Minkin, B. L., Timbers, G. D., Timbers, B. J., Fixsen, D. L., Phillips, E. L., & Wolf, M. M. (1976). The social validation and training of conversational skills. Journal of Applied Behavior Analysis, 9, 127-139.

O'Dell, S., Krug, W., O'Quinn, J., & Kasnetz, M. (1980). Media-assisted parent training: A further analysis. The Behavior Therapist, 3, 19-21.

Panyan, M., Boozer, H., & Morris, N. (1970). Feedback to attendants as a reinforcer for applying operant techniques. Journal of Applied Behavior Analysis, 3, 1-4.

Panyan, M., & Patterson, E. (1974). Teaching attendants the applied aspects of behavior modification: An empirical approach. Mental Retardation, 12, 30-32.

Plaska, T., Burgess, J., & Tillema, M. (1979, June). The Boulder training model: A large-scale performance based system for training paraprofessional staff in an institution for the severely and profoundly retarded. Paper presented at the 5th annual convention of the Association for Behavior Analysis, Dearborn, MI.

Quilitch, H. R. (1975). A comparison of three staff-management procedures. Journal of Applied Behavior Analysis, 8, 59-66.

Schreibman, L., O'Neill, R., & Koegel, R. (1983). Behavior training for siblings of autistic children. Journal of Applied Behavior Analysis, 16, 129-138.

Stolz, S., & Associates. (1978). Ethical issues in behavior modification. San Francisco: Jossey-Bass Publishers.

Sulzer-Azaroff, B., & Mayer, G. (1977). Applying behavior-analysis procedures with children and youth. Chicago, IL: Holt, Rinehart and Winston.

Walls, R., Zane, T., & Thvedt, J. (1980). Trainer's personal methods compared to two structured training strategies. American Journal of Mental Deficiency, 84, 495-507.

APPENDIX A

Task: Packaging Bolts

Specific Target Behavior: When presented with a tray of three varying size bolts, the client places one of each size in a bag, on the command, "_____, put one of each in a bag."

General Instructions:

Format: Whole Task

Feedback: Modeling will first be used to demonstrate the steps in the task of packaging bolts. Verbal prompts will be given in accordance with the guidance hierarchy when appropriate. Reinforcement (tangibles and/or social praise) will be delivered when each trial is completed.

Procedure: The client will be seated at a table with a sorting tray of bolts and 10 bags directly in front of him/her. The staff member will be seated next to the client. Training is complete when bolts are correctly independently packaged over 3 consecutive sessions.

Materials: 30 bolts (10/size), sorting tray, chair, 10 bags.

CLIENT BEHAVIOR	STAFF BEHAVIOR
1. Gets one bolt per size from tray.	1. Give command. Have client pick up one bolt from each compartment in the sorting tray and set on table.
2. Gets bag.	2. Have client pick up one bag and open.
3. Places bolts in bag.	3. Have client pick up bolts and place in bag.
4. Closes bag.	4. Have client place the bag flat on the table and follow the plastic guide at the top of the bag with his/her fingers while pressing down.
5. Places bag in pile.	5. Have client place bag to the side.

Task: Thread Nuts and Bolts

Specific Target Behavior: Given a nut and a bolt, the client threads the nut on the bolt when given the command "_____, thread the nut on the bolt."

General Instructions:

Format: Whole Task

Feedback: Modeling will be first used to demonstrate the steps in threading a nut on a bolt. Verbal prompts will be given at each step in accordance with the guidance hierarchy when appropriate. Reinforcement (tangibles and/or social praise) will be delivered at the completion of each bolt (trial).

Procedure: The client should be seated at a table with the materials to the side and in front of the trainer. A session is composed of 10 trials each. Training is complete when 10 bolts are assembled independently for 3 consecutive sessions.

Materials: 10 nuts, 10 bolts, chair

CLIENT BEHAVIOR	STAFF BEHAVIOR
1. Picks up bolt with non-preferred hand.	1. Place nut and bolt in front of the client and give the command. Have client pick up bolt with nonpreferred hand and hold the head of the bolt.
2. Picks up nut with preferred hand.	2. Have client pick up nut holding outside edge with fingertips of preferred hand making sure the hole is not covered.
3. Places nut on end of bolt.	3. Have client place nut on end of bolt and turn slightly with a clockwise motion to begin threading process.
4. Threads nut all of the way to end of bolt.	4. Have client thread nut half of the way to the end of the bolt, place preferred hand at top of bolt and thread nut the rest of the way to the head.
5. Puts nut and bolt on table.	5. Have client put nut and bolt on table.

Task: Sweeping Dirt Into Dustpan

Specific Target Behavior: On command, "_____, sweep the dirt into the dustpan," client completely swept a pile of dirt into the dustpan.

General Instructions:

Format: Whole Task

Feedback: The entire task will be modeled initially by the staff member. The guidance hierarchy for verbal and physical prompting will be utilized when appropriate. Reinforcement (tangibles and/or social praise) will be delivered after each trial is completed.

Procedure: Ten piles of dirt (scraps of paper) will be placed two feet apart. The client will be handed a broom and dustpan and given the command. Training is complete when all 10 piles are swept independently for three consecutive sessions.

Materials: broom, dustpan, scraps of paper, waste basket.

CLIENT BEHAVIOR	STAFF BEHAVIOR
1. Picks up dustpan.	1. Have client pick up dustpan with nonpreferred hand and hold broom with preferred hand at slightly below waist level.
2. Sweeps paper into dustpan.	2. Have client use short strokes sweep paper into dustpan.
3. Empties dustpan.	3. Have client empty dustpan into wastebasket. Ten trials per session.

Task: Trimming Nails

Specific Target Behavior: When given the command, "_____, trim your nail," client trims nail.

General Instructions:

Format: Whole Task

Feedback: Modeling will be first used to demonstrate the steps in trimming a nail. Verbal prompts will be given at each step in accordance with the guidance hierarchy when appropriate. Reinforcement (tangibles and/or social praise) will be delivered at the completion of each nail.

Procedure: The client should be seated at a table facing the staff member. Training is complete when 10 nails are clipped to criterion independently for three consecutive sessions.

Materials: nail clippers, chair

CLIENT BEHAVIOR	STAFF BEHAVIOR
1. Gets clippers.	1. Give command. Have client get clippers.
2. Pulls handle on clippers.	2. Have client grasp clippers (pincer grasp) with preferred hand and lift up on pointed handle. Other hand holds clippers steady.
3. Turns handle on clippers.	3. Have client continue holding handle in preferred hand and turn 180 degrees. (Other hand holds clippers steady.)
4. Grasps clippers with pincer grasp.	4. Using preferred hand, have client grasp clippers with a pincer grasp (thumb on top of handle and bottom of clippers resting on the fingertips or first knuckle of the index finger).
5. Positions clippers on nail.	5. Have client position clippers on nail of opposite hand.

CLIENT BEHAVIOR	STAFF BEHAVIOR
6. Cuts nail.	6. Have client press down on handle and cut nail. Have client clip fingernail in an arc until the edge of the nail is smooth. Sequence may be repeated for multiple trials.
7. Closes handle on clippers.	7. Have client turn handle 180 degrees and close handle on clippers.
8. Replaces clippers.	8. Have client set clippers on table.

APPENDIX B

SKILL RATING FORM

Trainer Preparation:	YES	NO	NA
Trainer made the following preparations prior to the beginning of the session:			
1. Brings reinforcers to session	____	____	____
2. Sets up any equipment	____	____	____
3. Removes all extraneous materials	____	____	____
4. Positions table and data sheets properly	____	____	____
5. Selects a variety of reinforcers appropriate for the client	____	____	____
6. Properly positions client for maximal interaction:			
a. positioned to minimize distractions	____	____	____
b. positioned so data sheets, reinforcers, etc., are out of reach	____	____	____
Gaining Attention and Cueing:			
1. Presents specified S^D by:			
a. Presenting client's name			
b. pausing until client directs attention toward task or trainer			
c. follows the pause by the specified command			
example: (Name, COMMAND)	____	____	____
2. Uses consistent verbal commands as specified in the program for first trial and any later trials when no response for 5 sec. following completion	____	____	____
3. Verbal command is clear and audible.	____	____	____
4. Trainer looks at client's face when delivering a command	____	____	____

	YES	NO	NA
5. If client does not respond within 5 sec. after command is given, the trainer must then repeat steps 1-5 above.	_____	_____	_____

Prompting Hierarchy:

1. Prompts are given in correct sequence	_____	_____	_____
2. Given about 5 sec. for response from previous prompt or command or 1 sec. following error	_____	_____	_____
3. All prompts are clear/audible/ firm	_____	_____	_____
4. Verbal prompt is of the appropriate volume and tone	_____	_____	_____
5. Prompt is minimal with only enough information to elicit the correct response	_____	_____	_____
6. All prompts are relevant to task	_____	_____	_____

Graduated Guidance:

1. Given by trainer when appropriate a. Client is not resistive	_____	_____	_____
2. Guidance is directed toward body part at which movement is made	_____	_____	_____
3. Guidance is less than at last successful trial	_____	_____	_____

Consequating Behaviors:	YES	NO	NA
1. Trainer looks at client when delivering reinforcement	____	____	____
2. Praise or reinforcement is delivered within 1 sec. after the target response is made	____	____	____
3. Verbal reinforcement or praise is specific to task	____	____	____
4. If edibles or tangibles are used, verbal reinforcement is delivered simultaneously	____	____	____
5. Trainer withholds reinforcement for 5 sec. when an incorrect response is made	____	____	____
6. Trainer withholds reinforcement when an incompatible response is made	____	____	____
7. Trainer correctly records data immediately after each trial is completed	____	____	____

Post-Session:			
1. Returns client to location appropriate for that time of day	____	____	____
2. Returns all session materials to appropriate place	____	____	____

Percent Correct Responses: # Correct Responses/Total # Opportunities to Respond

Percent Correct Responses: _____

APPENDIX C

Scoring Procedure:

Checklist Rating Scale: Place a check in one of the appropriate columns (Yes, No, NA). Mark the Yes column if the trainer behavior occurred when appropriate and a check in the No column if the behavior did not occur when it should have. Place a check in the NA column if that component skill was not applicable to that particular trial.

CATEGORY	COMPONENT SKILL	QUESTIONS TO ASK YOURSELF
Trainer Preparation	1. Brings reinforcers to session	--did staff member bring to session
	2. Sets up any equipment necessary for training session	--were pencil, bolts, etc., placed in front of staff member
	3. Removes extraneous materials	--was table cleared of personal possessions and anything that did not relate to the program
	4. Positions table and data sheet properly	--was data sheet positioned for ease in recording --was table of proper height and size for task and client
	5. Variety of reinforcers	--was reinforcer appropriate for client --were a variety of reinforcers utilized (variety = one reinforcer used less than 50% of the total number of reinforcers given)

CATEGORY	COMPONENT SKILL	QUESTIONS TO ASK YOURSELF
	6. Properly positions client	--was client seated so that the data sheet and reinforcers were on the opposite side of the trainer --was client positioned to minimize distractions
Gaining Attention and Cueing	1. Presents S^D	--was client's name presented initially --was a pause placed between client's name and command --was the command placed after the pause and after the client had established eye contact with the trainer or looked at the task --was the command consistent with other commands given (if rating the first trial this does not apply but does on all other commands presented during training session) --does not have to be consistent with the command stated in the task analysis --if trainer does not present an initial command, #3 and 4 are marked NA and #1 and 2 are marked No.
	2. Consistent verbal command as specified in program task analysis	--was the specified command used consistently throughout the session

CATEGORY	COMPONENT SKILL	QUESTIONS TO ASK YOURSELF
	3. Verbal command was clear and audible	--was voice volume sufficient for client and observer to hear --was verbal command easy to understand
	4. Trainer looked at client's face	--did trainer look at client's face when delivering command
	5. No client response for approximately 5 sec. (depending upon the program)	--did trainer repeat steps 1-5 if no response was made for 5 sec. after the command was given
Prompting Hierarchy	1. Prompts in correct sequence	--were verbal prompts used before gestural prompts --were gestural prompts used before physical prompts
	2. 5 sec. for response or 1 sec. following error (according to task as modeled by trainer)	--was 5 sec. given for a response to occur before a more intrusive prompt was given --was a prompt given within 1 sec. following error --if no prompts were given when prompts should have, #2 is marked No or minus and #1, 3, 4, 5, and 6 are marked N/A
	3. Prompts clear/audible/ firm	--were prompts easy to understand --were verbal prompts of sufficient volume for client and observer to hear

CATEGORY	COMPONENT SKILL	QUESTIONS TO ASK YOURSELF
		--were gestural and physical prompts firm enough to convey information intended
	4. Verbal prompt appropriate volume and tone	--were verbal prompts of appropriate volume for client --were verbal prompts of appropriate tone for training session --were verbal prompts of appropriate tone for trainer/client interactions
	5. Prompt is minimal	--did prompt relay only enough information to complete step or task --did verbal prompt include only those words necessary to complete step or task
	6. Prompts relevant to task	--did prompt provide information about task at hand
Graduated Guidance	1. Given when appropriate	--was guidance given when client was not resistive
	2. Directed guidance	--was guidance directed toward body part involved in task
	3. Guidance was faded	--was the amount of guidance reduced with each successive trial in which the client was successful

CATEGORY	COMPONENT SKILL	QUESTIONS TO ASK YOURSELF
Consequating Behaviors	1. Trainer looked at client or task when delivering reinforcement	--were trainers eyes fixed on client's face when reinforcement was delivered after task completion --were trainers eyes fixed on task when reinforcement was delivered if a component of the task was completed (as in one trial completed)
	2. Praise or reinforcement delivered within 1 sec. after target response is made	--target response may be defined as completion of one trial or entire task --was reinforcement delivered within 1 sec. of target response --reinforcement cannot be delivered before or while the target response is being made, and delivered after 1 sec. following completion --was reinforcement made readily available --if no reinforcement is delivered #2 is marked No and #1, 3 are marked N/A
	3. Verbal reinforcement is specific to task	--did trainer reinforce by also stating that task or response which was being reinforced --a good example would be..."Good job of assembling." --a bad example would be..."Great!"

CATEGORY	COMPONENT SKILL	QUESTIONS TO ASK YOURSELF
	4. Edibles or tangibles paired with social praise	--were edibles or tangibles delivered simultaneously with verbal praise
	5. Trainer withholds reinforcement when an incorrect response is made (as modeled by trainer)	--was all reinforcement withheld for 5 sec. when an incorrect response was made --an incorrect response is a response not modeled by the trainer in completing the target response
	6. Trainer withholds reinforcement when an incompatible response is made	--was all reinforcement withheld for 5 sec. when an incompatible response was made --an incompatible response is defined as any response interfering with completion of the task at hand
	7. Trainer records data immediately after each trial is completed	--did trainer record immediately after each trial was completed and not before or during the completion of the target response
Post-Session	1. Returns client to location appropriate for that time of day	--was client returned after session was completed. --was client returned to site appropriate for that time of day
	2. Returns session materials	--were session materials returned to appropriate individual or place

APPENDIX D

REHABILITATION ASSOCIATE TRAINING
FOR EMPLOYED STAFF

CURRICULUM OUTLINE

CLUSTER: Behavior Management BT-2

Module:	Teaching New Behavior
Other Modules in Same Cluster	BT-1 Increasing Existing Behavior
	BT-3 Maintaining Behavior
	BT-4 Reducing and Eliminating Behavior
	BT-5 Motivational Systems
	BT-6 Targeting/Charting Behavior

Descriptors: Behavior modification, chaining, differentiation, discrimination training, discriminative stimulus, fading, generalization, programmed instruction, shaping, successive approximations, systematic instruction

Overview:

The module on teaching new behavior will acquaint staff with several procedures for teaching clients behaviors which they are not presently exhibiting. Staff will learn to use shaping, chaining, and fading techniques; as well as to teach using programmed instruction. These procedures can be applied to teaching skills in various areas: independent living, vocational, pre-academic, socialization, language, etc. This module will present examples of using these procedures to teach such behaviors. Staff will also be instructed on techniques to use to assure that a newly acquired behavior will be performed in various settings (generalization), or will only be performed in the specific setting in which it is desirable (discrimination). Individuals completing the module will write and implement programs, using the techniques they have been taught, for clients with whom they work.

TABLE OF CONTENTS

Objectives

The student should:

1. Define and give examples relevant to his/her setting of three of the following five terms, including when they are generally used:

   a. response differentiation (p-9)
   b. shaping (p-12)
   c. successive approximations (p-12)
   d. imitative prompt (p-18,24,29)
   e. discriminative stimulus (S^D) (p-18,24,25,29,40)
   f. generalization (p-34)

2. List and give examples of the two rules for the effective use of response differentiation. (p-9)

3. Be able to identify whether shaping and fading are being appropriately used. (p-12,27)

4. Given a situation, identify problems that might be encountered in implementing a shaping program. (p-12)

5. Given a client and an instructional objective, state the terminal goal and break the goal down into its component links. (Include at least five links). Write and implement a program, using shaping, prompting, and fading, which is designed to teach the chain. (all pages) (see instructional supplement)

6. When watching someone perform a complex behavior, be able to:

   a. identify the reinforcing event that probably maintains the chain
   b. trace the development of the entire chain in terms of how each link serves a dual function (p-22)

7. In a training situation, demonstrate the following procedures, combined with fading: (all pages, see particular p-9,19,31)

   a. response differentiation
   b. shaping
   c. chaining

8. In a training situation, use a matching-to-sample procedure to teach a client to discriminate his shoes from his socks. (p-40)

Objectives (cont'd.)

9. Demonstrate forward chaining and backward chaining. Explain when you might want to use each of the two procedures, and why. (p-22,23)

10. Select responses that belong to the same response class. (p-8)

11. In a training situation, demonstrate teaching a sorting task. Be sure to incorporate a correction procedure into your teaching process. (See instructional supplement)

12. Give an original example of, and demonstrate if possible, how stimuli that already control behavior in one situation can be introduced and stressed in a new environment. State the conditions under which generalization is most likely to occur, and why. (p-34)

13. Demonstrate:

    a. a discrimination procedure (p-18,24,35,39,40)
    b. a generalization procedure (p-34)

14. List two advantages and two possible disadvantages of fading. (p-31)

15. In a training situation, demonstrate combining S^D's with shaping. (p-18)

16. Given a description of a training situation, identify whether or not a graduated guidance procedure is the appropriate procedure to use. If not, suggest an alternative approach. (p-19)

Introduction

Many times, clients do not have desired behaviors in their repertoires. Thus, staff must be competent in teaching clients behaviors which they do not exhibit. For example, it is generally desirable to teach the inattentive student or worker to attend to a task; one may also need to teach specific work tasks and social behaviors (e.g., sharing to a non-sharer), as well as many other complex motor, social, academic, and vocational skills.

It is not possible to simply reward such behaviors or prompt their occurrence, since the client has not learned how to perform the behavior. For example, it is not possible to reward a person's language if he has never said anything that resembles a comprehensible word. A student will not write numbers nor a beginning cook prepare a meal if such behavior or its parts are not within their repertoires. First, the behavior or its parts must be emitted; only then can it be rewarded or strengthened.

This module will present a set of procedures designed to teach new behaviors. Remember, these techniques are not meant to increase or decrease the occurrence of a behavior, but simply to teach a client a behavior he cannot presently perform.

Before attempting to teach a new behavior, it is important to decide exactly what it is you want to teach. This is called specifying behavioral dimensions. One must decide exactly what characteristics the new behavior should have.

The behavioral dimensions of any response or behavior are those characteristics by which the response can be described and measured. For example:

> How often does the behavior occur? (Frequency)
>
> How forceful, strong, or intense is the behavior? (Intensity)
>
> How long does it take to complete the behavior? (Duration)
>
> What does the behavior look like? What shape or form is it? (Topography)

It is not enough to say that a client should be able to hammer a nail. The behavioral dimensions of "hammering a nail" must be specified. For example:

> "The client should be able to hammer a nail each time he is instructed to do so for ten trials (frequency), with a firm enough stroke so that it penetrates the board (intensity). The nail should be straight varying no more than 85° -90° from the horizontal board (topography). He should accurately pound a nail in less than ten seconds (duration)."

Without this kind of specification of behavioral dimensions, some aspects of the behavior may be neglected and an adequate performance may never be reached. For instance, if you had not specified the frequency dimension, the accurate hammering of one nail could be given as proof that the new behavior had been learned. But it could be just as likely that the nail was hammered simply by chance, and the behavior would not be repeated under the same conditions.

Response class is defined as a grouping of all responses which have at least one characteristic in common. Since responses (or behaviors) have many characteristics, there are many different ways they can be formed into response classes. For example, responses with similar movements are classified into the same response class (e.g., knee jerks, eye blinks, turning responses, climbing responses). Another method of classification is according to the effect responses have on the environment; responses may be placed in the same response class if they have the same effect on the environment (e.g., "doorbell-ringing responses", "house cleaning responses", "shopping behavior").

Response Differentiation

There are many ways an individual learns new behaviors. Sometimes new behaviors are refinements of more gross behaviors that he already knows. For example, a worker who knows how to swing a hammer refines that behavior so that he is able to accurately pound a nail. A student's scribbling gradually becomes refined into recognizable letters and drawings. A beginner's awkward swing of a tennis racket or golf club becomes refined into a consistent placement of the ball in a designated area. The early attempts of the cook develop from a state of mess and confusion and burnt food to a well-prepared meal. In each of these examples, a set of gross responses gradually becomes refined until it reaches a specific criterion that is acceptable.

For each of the terms described as acceptable criteria, it is possible to select a set of behavior dimensions. For example, "consistent placement of the ball" might be defined as: The ball must land in a specified area X times out of X tries when hit from a distance of X feet. It is from such specifications that the definition of response

differentiation comes: "The reinforcement of only those instances of behavior that fall within the limits and meet the restrictions and requirements set on behavioral dimensions is known as the procedure of response differentiation (Millenson, 1967, p. 163." Response differentiation occurs when one behavior of a response class is positively reinforced while other members are not reinforced. In this way, the reinforced response becomes differentiated and occurs more often than other behaviors in the response class that have not been reinforced.

The definition of response differentiation includes the means by which the response is refined: reinforcement. The technique is to reinforce the designated aspects of a behavior; and not to reinforce the other, non-relevant aspects. For example, accurate swings of a tennis racket or golf club are reinforced by the ball being placed accurately; by approval from peers; and, eventually, by winning a game or tournament. The cook is reinforced by eating a tasty meal and/or receiving the approval of those who eat it. The process of reinforcing only one response and neglecting to reinforce other responses of that class is called differential reinforcement. Through the process of differential reinforcement of one response in a response class, response differentiation takes place.

When using response differentiation in teaching new behaviors to clients, the reinforcement may not come from such "natural" sources as peers, or the client's perception of the acceptable criteria. We, as trainers and teachers, must assure that appropriate and adequate reinforcement is given. In other words, we must program for reinforcement, and not assume that it will just "naturally" occur. Response differentiation will be achieved most effectively when reinforcement

- -is delivered as soon as possible following the emission of the desired behavior
- -is delivered as often as possible when the desired behavior occurs.

In addition, it is extremely important that every attempt be made to withhold reinforcement from the non-relevant aspects of the behavior. For example, if the response that we want to occur is placing screws in boxes, we must be careful that we do not reinforce the client for non-relevant aspects of the behavior, such as singing while working, or placing the screws with the heads all facing in the same direction (which is unnecessary, and would make the task take more time).

Self-Test I

1. Performances may vary along one or more behavioral dimensions. List three of them.

2. The procedure of selectively reinforcing one response and neglecting to reinforce others is called _____ reinforcement.

3. Differential reinforcement of one response in a response class brings about the result of _____ _____.

4. Sometimes response intensity needs to be specified. Give three examples of behaviors for which intensity would be important. Specify an intensity requirement for each.

5. Identify the type(s) of behavioral dimensions specified in each of the following:

   a. _____ Speak on a topic of interest for ten minutes in complete sentences so that each member of your audience can hear you.

   b. _____ fork lifted to and entering mouth.

   c. _____ turn door knob to the left and pull toward you.

   d. _____ Sit in the group for the length of Ms. Lotus' presentation on child rearing in China.

   e. _____ Take one pill every four hours.

Self-Test I - Key

1. frequency, duration, intensity, topography

2. differential

3. response differentiation

4. Any accurate answers accepted

5. a. intensity, duration, topography
   b. topography
   c. topography
   d. duration
   e. frequency

Shaping, or the Method of Successive Approximations

Like response differentiation, shaping is used to form a behavior that does not exist in the individual's repertoire. The procedure for shaping a new behavior involves positive reinforcement of responses which may at first only faintly resemble the terminal (goal) behavior the instructor desires. Through a gradual process the responses which increasingly resemble the terminal goal behavior are successively conditioned until the terminal goal behavior is reached. The method of shaping or successive approximation differs from response differentiation in one extremely important way, although both involve differential reinforcement. In response differentiation, the response to receive differential reinforcement already occurs, although not with a very high frequency. In shaping, the terminal response does not currently occur, and often may have never occurred. Thus, rather than selecting and reinforcing the behavior, or those aspects of the behavior, that is the desired goal (as in response differentiation), elements of a behavior which resemble the desired behavior (i.e., improvements) are reinforced. Shaping is a much broader task to undertake than response differentiation. A complex shaping procedure may include several instances of response differentiation which take place at various stages or levels.

For example, suppose that one goal of a young man's IPP is that he should spend at least one-half hour each day on a climbing frame in order to further his physical development. However, he is observed to spend almost no time on the frame during activity periods. Instructor attention is selected as the reinforcer. The instructors should first attend to the young man's nearness to the frame. As he comes closer, they will progress to attending only to his touching it, then to his climbing up a little, and finally to extensive climbing. Technically, this procedure is reinforcement of successive approximations to climbing behavior, or shaping climbing behavior. The series of slight changes that are reinforced are referred to, technically, as successive approximations. Shaping is a procedure in which successive approximations to a goal behavior are reinforced.

"Shaping" refers more to the actions of the trainer, while the "method of successive approximation" emphasizes the logical progression of the procedure.

Regardless of the type of relationship existing between the initial and intermediate behaviors and the terminal goal behavior, the instructor reinforces certain behaviors because he/she believes they will increase the likelihood or

probability that the terminal response will occur. In selecting the behaviors to be reinforced and the sequences of the procedure, the trainer must rely heavily on the skill, experience, and knowledge he or she possesses.

Various characteristics of responses are amenable to shaping. Two of the these characteristics are topography and intensity or force. Topography refers to the physical characteristics of the behavior (i.e., what it looks like). A dance step has a different topography from swinging a golf club since the movements through space involved in each are vastly different. Shaping of response topographies was shown to be effective in inducing an autistic child to wear corrective glasses.

Shaping an Autistic Child to Wear Corrective Glasses with Positive Reinforcement

Dickie was an autistic child.[2] In the past few years, the word "autism" has generally replaced an earlier term, "childhood schizophrenia." Regardless of what Dickie was called, it was obvious his behavior was not appropriate. Dickie was prone to have temper tantrums and did not seem to care about either adults or children. He was not in the least responsive to others.

At the time Dickie was first seen by the psychologist, in the hospital, he was only three and a half years old. There were techniques to deal with the temper tantrums and, likewise, procedures which could make him more "sociable." In time, these methods have been successful in bringing Dickie's behavior more in line with that of other children.

There was one problem which was extremely critical and had to be solved with all possible speed. Cataracts were discovered in the lenses of both eyes when Dickie was nine months old. At about the age of two, he had a series of eye operations which terminated in the removal of the lenses from both eyes. After these operations, one thing was certain. If Dickie was to see, he would have to wear special corrective glasses for the remainder of his life. For almost a year after Dickie's eyes had healed, his parents endeavored to get him to wear the glasses. Try as they might, they could not coerce him to wear them more than a few seconds before they were thrown off as casually as if they were a dime store toy. Dickie's parents made the rounds of specialists, all of whom seemed to have a new diagnosis for Dickie. None, however, were able to outline a constructive treatment which

2. This section based on Wolf, M., Risley, T., and Mees, H. Application of operant conditioning procedures to the behavior problems of an autistic child. *Behaviour Research and Therapy*, 1964, *1*, 305–312.

Source: Shaping an Autistic Child to Wear Corrective Glasses with Positive Reinforcement, in Whaley, D. L., & Malott, R. W. Elementary Principles of Behavior. New York: Appleton-Century-Crofts, 1971. pp. 86-89.

would deal with his behavior problems. No suggestions were forthcoming which succeeded in persuading Dickie to wear his glasses.

By the time Dickie's parents brought him to the hospital, the situation had reached critical proportions. At the age of three and a half, a child is developing rapidly. He should be learning about his environment and how he may function appropriately within it. Any child, even one who did not have Dickie's autistic behaviors, would be severely handicapped at this stage in his development without adequate vision.

The psychologists who took on Dickie's case decided to use positive reinforcement and behavior shaping techniques. Before any experimental procedures were enacted, they observed Dickie's behavior with his glasses. Just as his parents had said, Dickie kept them on for a few brief seconds before disposing of them. At best, the glasses were neutral to him. They did not make his life more meaningful. It was thought he might even find the prescription glasses mildly aversive. There was some discomfort associated with the frames on Dickie's nose and ears and the lenses themselves undoubtedly changed the way the world looked to him, which may have been initially unpleasant. In order to avoid breakage of expensive prescription glasses, the experimenters initially used frames without lenses. If the psychologists could shape the response of wearing these frames for long periods of time, the prescription glasses could be less unobtrusively switched in later.

The person actively involved with Dickie and his treatment was instructed to spend two or three 20-minute sessions each day with him in his room. The positive reinforcer consisted of small bites of candy or fruit which, in the beginning, Dickie seemed to enjoy greatly.

Initially, the frames were placed about the room and Dickie was reinforced in gradual sequences for approaching them, picking them up, holding them, and carrying them about. Later, movements of the frames toward his face were reinforced. Slowly the frames were brought closer and closer to his eyes.

Up to this point, the experimenters had achieved success in a remarkable fashion, but trouble was on its way. Dickie refused to wear the glasses with the eye openings in the correct position. Often they were cocked to one side of his head with the earpieces below his ears rather than on top of them. Some difficulty with the use of candy and fruit as reinforcers also developed. It appeared, after about two weeks, that these substances were no longer acting as effective reinforcers. Perhaps Dickie had become satiated with them during the long and numerous sessions. The procedure was adjusted. Breakfast was withheld and small bites of it were used as a positive reinforcer. In order to give him some help in positioning the glasses, larger ear frames were added to make placing them on his ears a simpler task. In addition, a "roll" bar was fitted from one earpiece across his head to the other earpiece. These modifications helped to correct many of the errors of placement.

At the beginning of the fifth week, however, the frames were still not being worn properly. More time was accordingly spent in the shaping procedure. In addition, a second bar was added to the back of the glasses, making them fit like a cap.

Near the end of the fifth week there was still some difficulty and Dickie was not progressing rapidly enough. It was the third session of that day. Dickie had performed poorly in the first two sessions, had received few reinforcements, and was understandably hungry. When the experimenter came to his room bearing ice cream, Dickie's face lit up perceptibly. He quickly picked up his glasses and placed them on his head. Progress was so fast during the first few minutes that the prescription glasses were substituted for the lenseless frames. After 30 minutes Dickie was wearing the glasses properly and looking out the lenses at various toys periodically displayed in hopes of maintaining his looking behavior. After this crucial session, progress was rapid. Soon he was wearing the glasses throughout mealtimes in his room.

Once the behavior was regularly maintained by powerful reinforcers, other reinforcers which were not so strong and did not rely on deprivation were employed. Often an attendant approached Dickie with the suggestion, "Put on your glasses and we'll go for a walk." Dickie was quick to comply. Other kinds of favors, treats, excursions, and outings were available to Dickie if he consented to wear his glasses.

Shaping procedures were ultimately highly successful with Dickie. At the time he was discharged from the hospital, he had worn the glasses for a total time of six hundred hours. On the average, he wore the glasses for 12 hours a day, which is more than reasonable for any child his age.

The importance of wearing glasses for Dickie's development is obvious. If his future were to hold even a wisp of promise, certainly he must have adequate eyesight. When Dickie was able to view the world much as other children view it, the treatment of other problem behaviors was aided considerably.

In shaping behavior, it can be seen that one response is reinforced and then replaced by another which is nearer in character to the terminal behavior the experimenter has in mind. Of course, there are many ways that one response can be said to differ from or resemble another. One important way which was discussed previously is the sequence of movements in each response and the relationship of each movement to the space surrounding the organism. The swing of a baseball bat differs from the swing of a golf club. A baseball swing takes place primarily in a horizontal plane. The bat initially moves in one direction only, forward, and then arcs to the left, or to the right if the batter is left-handed. A golf swing is primarily in a vertical plane and goes from the tee, high above, and then pauses and changes direction. Differences in movement through space are known as differences in *topography*. A swimming stroke or behavior involves a vastly different topography from dancing or running track. The topography of each of these responses differs greatly from the topography of a vocal response.

In Dickie's treatment, several different topographies were reinforced. The topography of approaching the glasses differed from that of picking them up, which in turn differed from that of placing the glasses on his head. The topography of placing the glasses *correctly* on Dickie's head differed from the response topography of incorrect placement, although the difference was of a lesser degree. This minimal difference made the final shaping task difficult and called for various new maneuvers from the experimenters.

Generally, shaping or successive approximation refers to systematically reinforcing different response topographies. There are ways, however, in which responses may differ other than topography. Two responses may have exactly the same topography but may differ in other physical dimensions. Let us take the example of two young men at a carnival, both of whom are trying to impress their girl friends with seemingly boundless physical powers. The task at hand involves ringing a bell by hitting a platform with a large wooden mallet. If the bell is rung, the ringer is rewarded with a large panda bear, which he immediately, and with some ceremony, bestows on his lady of the hour. One young man picks up the mallet and approaches the platform. He swings mightily but the indicator does not rise to its terminus. The bell does not ring. Rejected, he sulks away in failure. The second man picks up the mallet and approaches the platform. His swing is identical in topography to that of his predecessor. He swings harder, however, and with more force. When the mallet hits the platform, the indicator rises sharply and rings the bell. The hero takes his prize and awards it, taking full privileges in the process.

The swinging behaviors of the two young men did not differ in topography. There were, however, differences in the force with which the two responses occurred. As usual, the hard swinger is a winner.

Just as responses with different topographies can be shaped through the method of successive approximation, so can responses with the same topography be selectively shaped to occur with greater force or intensity.

Vocal behavior may also be analyzed in terms of its topography or intensity. Sounds may topographically differ from each other in the syllables they contain, the points of inflections, and various other qualitative characteristics of speech. Two words or sounds may have the same vocal topographies but differ only in terms of intensity. By and large, the logic and procedure for shaping intensity does not differ greatly from shaping across topographies.

In some instances, intensity considerations are primary in behavioral problems, and appropriate therapy involves increasing or decreasing the intensity dimension of a response.

Responses may have identical topographies but differ in intensity or force. Intensity may be increased from a weak level to a higher magnitude through shaping.

There is no reason why shaping cannot be used with groups of clients. Approximations can be set for a group, just as for an individual. Or, when all individuals in the group achieve approximations of their respective assignments, a group-reinforcing activity can be delivered. However, one must be careful in assigning tasks to individuals because if one client is given too difficult a task, all others will be penalized. For example, when each worker in a group at a sheltered workshop has worked to his/her individual criterion, the group is given a coffee break.

There are several important points to remember in order to use shaping effectively:

1. Keep the goal in mind. As with the use of other behavioral procedures, the first step in shaping is to clearly specify the terminal behavior, along with the criteria for determining success. A clear and precise statement of the goal reduces the likelihood of strengthening irrelevant responses and increases the likelihood of reinforcing appropriate approximations. If the terminal goal is stated in vague terms, there is likely to be a failure to observe and reinforce some approximations to the desired behavior.

2. Finding a starting point. A starting point must be found, even though the initial behavior may bear little or no resemblence to the desired final performance. Here, observing the client in the natural setting becomes very important. (Through observation, you can identify one or more behaviors in which a client engages at a fairly frequent rate, and which may at least somewhat resemble the final goal behavior. The decision on a starting point must take into account practical considerations, including the similarity between the starting behaviors and the desired terminal behavior.

3. Set up the series of steps. Perform a task analysis, and decide what steps you will teach. Be sure to sequence these steps in what you consider to be the proper order. The steps can always be changed, if you decide they are too small or too large, as you proceed with teaching the task.

4. Carry out the shaping procedure. Shaping is carried out in a steplike progression. The continuum of behaviors that fall between the starting point and the terminal goal are broken down into a series of steps, or successive approximations. Some important factors need to be considered:

   - How large should each step be
   - How long should be spent at each step before preceeding to the next?
   - What should be done if the behavior begins to disintegrate?

   Unfortunately, there are no easy answers to these questions. It is necessary to closely observe the behavior of the individual client or student. If the client is making consistent and satisfactory progress, the instructor can assume that the size of each step and the amount of practice at each level has been appropriately selected. If the progress begins to level off, falter, or deteriorate, the selection of steps should be reexamined. The situation should be arranged so that the client will be able to succeed much more often than he fails. For if one fails, no reinforcement will be given, and the behavior will begin to disintegrate. Disintegration of the behavior suggests the need for smaller steps and more practice. It is very possible that some later time the step size can be increased.

   Sometimes the reverse happens: the step sizes originally selected are too small or the client is required to remain at one particular level for too long a time. It becomes evident that steps might be too small when the client begins to become inattentive and show other signs of boredom. This problem can be put to the test. Steps can be enlarged and practiced on each level and reduced to determine if the student's performance begins to improve. If it does, then the altered conditions should obviously remain in effect.

   Occasionally, progress may seem to be going along smoothly, when the client suddenly stops progressing. In such a situation it is possible that too much practice has been given at one step, and the behavioral approximation has become more firmly established at that level than was desired. (In order for progress to continue, it may be necessary to make the next approximation

very easy; in other words, make the next step a small one, so that the client will be sure to be successful.)

It should be noted that shaping is not an easy, "cut-and-dried" procedure to implement. It is often difficult and time consuming, but worth the effort if a client is able to perform a task that he could not perform prior to the training.

5. Combining discriminative stimuli with shaping. A discriminative stimulus (S^D) is a stimulus in whose presence a given response is likely to be reinforced. An S^D operates to bring about a particular responses in that it signals the likelihood of reinforcement. Instructions, prompts, and other discriminative stimuli (S^D's) will not bring about the desired behavior if the behavior, or its components, are not present in the repertoire of the individual. Discriminative stimuli, however, can be used to help bring about the approximations to the desired response. For example, suppose we have a client who does not speak aloud. Let's suppose that the client had begun to whisper to her work supervisor. The supervisor could use discriminative stimuli in order to elicit more frequent occurrences of the response. The supervisor might say, for instance, "Good. I like what you said." (the reinforcement) and then, "Would you please say it again?" (the S^D). Or the supervisor might bring about other whispering responses by asking other questions of the client, nodding expectantly toward the client, or gesturing.

6. Combining imitative prompting with shaping. An imitative prompt is a specific kind of discriminative stimulus. It may bring about an imitative response, especially if the response was reinforced in the past when it was similar to the model's behavior. Just as other S^D's may tend to bring about an approximation, the behavior of a model may also bring about an imitated approximation to a behavior that is too complex for direct imitation. Rather than simply waiting for the approximation to the desired behavior to occur, the approximation could be demonstrated to the client by an instructor or other client. This is the same procedure used by speech therapists when they attempt to shape the proper articulation of a word.

7. Combining physical guidance with shaping. Physical guidance is a method of eliciting a response in which the appropriate body part or parts are "put through" or physically guided through the proper motion. For example, a swimming coach guiding the movement of a youth's arm to demonstrate the proper stroke is using the physical guidance procedure.

   Sometimes simply reinforcing a few guided trials is enough, and individuals take over movements on their own. For others, an abrupt transfer from physical guidance to no physical guidance is too large a step, and some intervening steps must be added. The graduated-guidance procedure (described in Foxx and Azrin, 1972) is especially appropriate for those clients who are agreeable to its use. Graduated guidance begins with as much assistance as necessary for the motion to be completed. Guidance is first focused on the body part that is the center of action, for example, the hand in spoon feeding. Gradually, the pressure is reduced, and the point of guidance moves away (e.g., from hand to arm, to shoulder, etc.). The graduated guidance procedure has been used to teach many complex responses, like self-care and vocational skills (Thomas et al, 1976).

   It is advised that graduated guidance not be used with violently resistant or uncooperative clients. To do so may be ethically questionable, as well as counterproductive.

   Physical guidance is most successfully used to elicit approximations toward motor skills.

8. Combining fading with shaping. It has been stated that the shaping procedure can be facilitated by bringing about approximations through the presentation of appropriate S^D's before a new step in the shaping procedure is initiated. Thus, the client will not remain dependent on the S^D's, but will perform the approximations to the terminal behavior independently. An example of fading cues and prompts to approximations is a graduated guidance procedure used to reduce retarded clients' dependence upon physical guidance while learning approximations to walking (O'Brien, Azrin, and Bugle, 1972).

   In this study, a training program was designed to increase the ease and speed of walking relative to that of crawling, and consisted of restraint-for-

crawling and priming-of-walking. When the child crawled for three seconds, the trainer held the child by the waist for five seconds, then placed the child in a standing position. The time and force of holding the child was gradually decreased as the child began to spend less time crawling and more time walking. When training was discontinued, some permanent improvement was noted for all four children in the study.

The prompting hierarchy which is generally accepted is:

verbal prompt (instruction or command) gestural prompt (modeling) physical prompt (graduated guidance).

The verbal prompt is tried first; if it does not initiate the response, a gestural prompt is implemented; if the response still does not occur, physical guidance is given. The hierarchy is faded in the reverse order: physical guidance is reduced and eliminated, and a gestural prompt is substituted. Then the gestural prompt is faded out, and only a verbal prompt is given. Finally, even the verbal prompt is faded out.

9. Strengthening the new behavior. Once a new behavior has been shaped, it is generally present in the repertoire of the individual at a low strength. Thus, it is very important to take the newly achieved target behavior and submit it to procedures for strengthening it (i.e., reinforcement). Reaching the terminal goal is not enough. A new behavior is likely to deteriorate rapidly if it is not immediately and consistently reinforced for a great many trials. Applying the principles for strengthening a behavior (See Module BT-1, "Increasing Existing Behavior") should increase the likelihood that the new behavior will persist. Then, once the new behavior has become pretty firmly established, procedures designed to maintain it can be implemented.

Self-Test 2

1. Define and illustrate each of the following terms:

   a. Shaping (illustrate the use of shaping with an individual and with a group).

   b. Successive approximations

   c. Prompt

2. List and illustrate the major factors that make shaping easier.

3. Give an example of combining S^D's with shaping.

4. State what potential problems, if any, may be encountered in the following shaping program:

   Mr. Jones is teaching five autistic adults to emit appropriate sounds of the letters in the alphabet. Since none of his clients can say any of the letters he decides to use a shaping program to teach them. He breaks down the task of saying each letter into five steps. Each approximation of a step that the whole group reaches he reinforces with praise and a craft activity involving letters.

5. State a behavior objective and an accompanying set of behavioral dimensions for a terminal behavior to be shaped from the existing repertoire of a client with whom you are familiar. (Invent a client if necessary) List at least two behaviors that the client engages in frequently that bear some similarity to the goal behavior. Select one of these approximations as your starting behavior, and defend your selection.

Chaining

Most behaviors actually consist of sequences, or chains, of behaviors. The links in the chains are each made up of similar components. For example, eating can be broken down into a set of component behaviors: placing food on a spoon, bending arm, opening mouth, inserting spoon, removing empty spoon, chewing food, swallowing. The behavior of eating, itself, can be part of another chain (e.g., going to lunch). Furthermore, components of the chain in "eating", such as "chewing food" can be broken down even smaller into various mouth movements. Effective procedures designed to produce such complex behavioral sequences or chains, can be used to teach new behaviors.

Chaining is accomplished by taking simple behaviors already in the repertoire of the individual and combining them into more complex behaviors. But, how does one establish a behavioral chain? How can a series of previously learned behaviors be combined and strengthened when reinforcement seems to occur only at the end of the behavioral chain? The answer is related to the principle of conditioned reinforcement.

When a stimulus or event is paired with, or directly comes before reinforcement, it will, over time, tend to become a reinforcer itself. The stimuli that acquire such conditioned reinforcing properties act to cement the links in the chain into a complex behavior that can be strengthened or maintained by a single reinforcer.

For example, take the complex behavior of eating. If placing food into the mouth has in the past consistently been a reinforcer, opening one's mouth will become a signal that reinforcement is coming; thus, opening the mouth will become a discriminative stimulus (S^D). Through further pairings with reinforcement, the discriminative stimulus itself, "opening mouth" will begin to reinforce the prior link in the chain, "placing food on spoon", and so on.

Thus, each behavior which makes up a chain has a dual function. Each behavioral link reinforces the behavior it follows and serves as a discriminative stimulus to bring about the response it precedes.

Here are a few procedures that are designed to facilitate the development of behavioral chains:

1. Precise task analysis. As with shaping, it is very important to have a clear description of the steps to follow in a chaining procedure. Because the order of component behaviors is so crucial to the

development of the appropriate target behavior, each component and its place in the sequence must be precisely specified. Analyzing a task is not always simple. Nor are all task analyses performed on simple tasks. To illustrate this point, try to do an "arm chair" analysis of a familiar task (e.g., washing dishes, preparing a meal, changing a tire). Then try it out on yourself or on a friend to see whether or not you have actually included all the links in the chain.

The figure below diagrams a task analysis of the chain "washing hair at the sink", one of the target behaviors that was selected from a group of community-bound retarded women who had been institutionalized. (Gustafson, Hotte, and Carsky, 1976) The sequence of behaviors must follow the specified order for hair washing to be considered correct. What if Step 6 ("apply shampoo to hair") were omitted? It is unlikely that the client would have clean hair.

Name:_____

Washing Hair at Sink

Date:							
1. Collect shampoo, towel, comb							
2. Remove blouse or shirt							
3. Place shampoo, towel, comb near sink							
4. Adjust water to lukewarm							
5. Wet hair thoroughly							
6. Apply shampoo to hair							
7. Rub into hair and scalp to form suds							
8. Rinse hair thoroughly							
9. Towel dry hair							
10. Place cap on shampoo							
11. Comb out hair							
12. Put clothing back on							
13. Return shampoo, towel, comb to respective places							

Figure 17.2 Task analysis of the chain "washing hair at the sink." (Gustafson, Hotte & Carsky, 1976)

2. Use of links that are already in the response repertoire. A basic principle for establishing chains efficiently is to try to form the chain from behaviors that are already part of the individual's repertoire. It is easier to teach an individual to dress himself if he can already put on each individual article of clothing, than to have to shape putting on each article of clothing as part of that particular procedure.

   Frequently, it is possible to achieve terminal goal behaviors that are almost identical but are actually composed of different components. Teaching female clients to wash their hair in the shower, rather than at the sink, is an example. When there is a close resemblance between two acceptable complex terminal goal behaviors, the behavior with more components fairly well established in one person's repertoire is generally the one that will be acquired more easily. Given a choice, that would be the behavioral chain to be trained.

3. Backward chaining (Beginning with the final link). Stimuli may take on conditioned reinforcing properties as a function of being paired with either primary reinforcers or other conditioned reinforcers. However, it takes many pairings of a stimulus with a reinforcer before the new stimulus will begin, of itself, to assume reinforcing properties. In a behavioral chain, the component behavior that is emitted with the greatest proximity to, and shortest time delay from, the reinforcer is paired most frequently with the reinforcer. A behavior toward the end of the chain (i.e., closer to the reinforcement) will become a stronger reinforcer than its prior link in the chain. The shorter the delay between the response and the reinforcement, the more effective the reinforcement. Thus, it is logical in training chains or responses that they be started, whenever feasible, with the final link in the chain rather than at the beginning of a complex sequence. That is, a good way to teach a complex behavior is to use <u>backward chaining</u>.

   Feeding and dressing skills have effectively been taught using backward chaining. There are several questions that have come up regarding the advisability or necessity for teaching a complex behavior by means of a backwards chaining procedure:

- Is there sufficient evidence to support using this approach in all situations?

- Isn't it just as effective to add on behavioral components from the beginning?

There is no clear answer to either question at this time. There has not been much research conducted with humans on this topic. But where the procedure has been used, especially in teaching behavior that has been very difficult for an individual to learn, it has been successful. Most conventional instruction is organized in a "logical" sequence, beginning at the beginning and ending with the completed behavior. The backward chaining procedure can probably make its greatest contribution when a client experiences difficulty in acquiring a complex behavior.

4. Use of discriminative stimuli: In addition to the discriminative stimuli (S^D's) that are an integral part of the behavioral chain, other S^D's might shorten the time needed to establish a fairly simple behavioral chain. For example, if an instructor said, "Please go to the dining room and eat your lunch", and consistently reinforced the behavior chain that followed, that behavior chain would probably be acquired more rapidly than if the instructor had simply waited for the chain to be emitted spontaneously.

5. Imitative prompting combined with chaining: Individuals frequently do imitate behaviors that are novel for them, as long as the behavior modeled is not too complex, and provided that most of the behavioral components are already in their repertoires. Thus, complex behavior can often be occasioned by simply providing a model. Even clients who fail initially to imitate can be taught to do so since imitative behavior can be shaped as a single response class. Baer, Peterson, and Sherman (1967) successfully trained three severely retarded children to imitate a wide variety of simple behaviors by directly reinforcing their imitations of some of those behaviors. However, with more complex behavioral models, direct imitation may be hard to accomplish. Acquiring the proper order or sequence of behaviors in a more complex chain may prove too difficult if the entire sequence is presented all at once. With longer or more complex chains, one might have more success if the chain were broken down into shorter sequences

and each of these presented as imitative prompts. The clients could then first imitate each of the links in the chain. Then the chain could be gradually solidified and the intermediate prompts could be phased out. A question which often comes up is, "Why not simply provide discriminative stimuli, such as directions or models, to teach all complex behavioral chains?" The answer is partly that directions or imitative prompts may not be adequate S^D's for all clients. They may often not bring about about the desired behavior. Moreover, it is often the same client for whom directions are ineffective, that it is difficult to find an effective model for. Also one must keep in mind that the components of the particular chain may not be in the individual's response repertoire.

6. Using chaining when links are absent from a client's response repertoire: Many behavioral chains are too complex to be occasioned by imitative or other discriminative prompts. In such cases, each of the component behaviors must be acquired, largely through shaping, strengthened through reinforcement, and perhaps brought about by various S^D's or prompts. Once the component behaviors are acquired in strength, it may be possible to combine them into a chain.

7. Strengthening response chains: The first time that Joe feeds himself, that Carol dresses herself correctly, or that Mary prepares a meal the response is still rather weak, for the chain, unless strengthened, can easily be disrupted. Component behaviors may still be left out, their order mixed up, or inappropriate behaviors added. Joe may pick up his spoon, scoop some food, and place the spoon back on the plate. Carol can leave her buttons open, and Mary may take the food out of the oven too quickly. It is extremely important that the full chain, emitted in proper order, be effectively reinforced as often as possible, as quickly as possible, with adequate amounts of reinforcers known to be effective for the individual. His houseparent would have to observe Joe's eating to be sure that it was correctly carried out and would have to follow it with an effective reinforcer. Carol's mother should take the time to see that she has properly dressed herself and should compliment her on the accomplishment. Mary's instructor should check her during her preparation of the meal several times and should comment positively, when appropriate.

Prompts may be given as needed. As in all instances in which behaviors occur at low strength, these optimal conditions must be continued. Eventually, it will be advisable to shift to procedures for maintaining well-established behaviors.

Self-Test 3

1. Define and give an example of each of the following terms:

   a. links
   b. chain
   c. chaining (forward and backward).

2. Describe and give an example of the two functions played by each behavior in a chain.

3. List, and give examples of, some things that you can do to make chaining easier.

4. How do you strengthen a chain once it occurs?

5. Joe teaches a course in basic motor repair to mildly retarded individuals. One unit in the course is devoted to the taking apart and the rebuilding of a small motor. Generally, students in the course have had difficulty in mastering the chain. Joe's usual strategy is to demonstrate the entire chain, step-by-step, before the whole class and then let each of them try it themselves until they get it right. What suggestions could you give Joe that might improve his instruction?

Fading

Basic to all programming is the notion that learned behavior should ultimately be emitted "spontaneously" rather than always as a response to a prompt or cue. When clients are described as "being independent", "showing initiative", or "being motivated", they are generally emitting behavior in the absence of obvious external cues. Fading is one technique through which these behavioral characteristics can be developed.

Fading involves gradually removing discriminative stimuli (S^D's), such as prompts and cues. Once this is accomplished, the behavior comes under the control of more natural or desirable S^D's. During fading, while goal behaviors or approximations to goal behaviors are consistently reinforced, the S^D's that temporarily served to bring about those behaviors are slowly and progressively diminished (or "faded out"). The use of fading is designed for the purpose of developing a terminal goal behavior that is emitted in the presence of only minimal or no prompting.

Many skills can be taught more effectively by means of fading techniques. For example, verbal prompts can be used initially to assist clients in learning assembly of a task in the workshop. The instructor or supervisor can specify each step as the clients progress through the task. After they have performed the task several times, the instructor can then gradually fade out the verbal prompts, and the clients can perform without them. In each situation where prompting is effectively used, the instructor gradually fades out the prompts or instructions connected with specific verbal, motor, or physical tasks.

In the "real world" spoken and written prompts are rarely present. If prompts are not faded, they may tend to become crutches. Fading helps to remove the need for such crutches. In addition, because fading is gradual, a situation in which the client may fail to exhibit behavior that would be reinforced is avoided.

Fading is commonly used in many settings. For example, to teach a client to use a tool, the work supervisor may first use modeling and instructions. As the client learns how to use the tool, such supplementary discriminative stimuli (S^D's) are gradually withdrawn. Likewise, when an individual is taught to eat, many prompts or supplementary S^D's are initially used. The instructor guides the person's hand, in which the spoon is held, first to scoop up the food and then to put it into his mouth. As the individual becomes more proficient in using the spoon, such prompting is gradually faded. The client is eventually able to eat

without any prompting. Many other self-help skills (e.g., dressing and undressing) are taught in a similar fashion. Fading was used by McReynolds (1972) to wean a child from a pacifier. An eighth of an inch was cut off the open end of a three-piece pacifier every two days. In about two weeks, the child threw it away. It became too much trouble to hold it in his mouth. The pacifier had lost its controlling properties. No thumb sucking or other excessive oral activity was noted over the following year. Fading was also used to teach a young woman to take her medication on time (Sulzer-Azaroff and Mayer, 1977). The nurse or the woman's parents faded out their verbal reminders, shifting control to the relevant S^D, the clock.

It is possible to fade out supplementary prompts and shift control to natural stimuli smoothly and effectively, with minimal disruption. This goal is best accomplished by removing prompts gradually - not too abruptly - and by moving toward more natural prompts. The following methods will assist you in developing the subtle skills needed in transferring stimulus control from artificial prompts to natural stimuli, as well as in avoiding and minimizing errors, when using fading.

1. Finding prompts that reliably bring about the desired response. Given stimuli tend to bring about given responses. However, responses to different stimuli by different individuals may vary, depending on the learning history of an individual. Carefully observing the client should be helpful in selecting the prompts that will reliably bring about the desired response and thus minimize the student's failures.

2. Gradually and progressively removing prompts. Once the desired response has been brought about by "artificial" prompts, it is a good idea to gradually and progressively remove those prompts until all are gone. An important guideline to follow is to prompt just barely enough to bring about the response, while avoiding abrupt reductions in the prompting. If the client begins to make many mistakes, one can reasonably assume that the reduction has been too abrupt.

3. Not overusing artificial prompts. Along with reducing prompts gradually, it is best to avoid overusing artificial prompts. Too many prompts might make a client overly dependent upon them.

4. Working toward prompts that are most natural. Various strategies, like verbal, imitative, and

physical prompting begin with the least intrusive prompts, those that do the least to alter prevailing environment conditions, and proceed to those that are less natural. For example, presenting artificial gimmicks or physically guiding an individual's movements is far more intrusive than modeling the behavior, which may be more intrusive than telling how it is to be done. The process is reversed in fading. Fading is initiated with the strategy that is currently controlling the appropriate response and gradually proceed through those that are less and less intrusive. For example, Mary has been feeding herself. She feeds herself successfully when her movements are physically guided. If Mary is to move into a home in the community, she should feed herself without any prompting at all. To achieve that goal, the first step is to pair instructions with physical guidance. The instructor then fades out physical guidance, substituting imitative prompts while continuing the instructions. Then the instructor fades the demonstrations and uses only instructions. Instructions may then be faded and replaced by some unspoken language - perhaps pointing to the food. Even that prompt is ultimately faded until the critical S^D, the plate of food alone, comes to bring about self-feeding behavior.

5. Fading out physically guided prompts. A physical prompt should be faded as soon as possible to prevent overdependence upon it. If an instructor continually physically guides a client through a workshop task, the client may refuse to perform the task by himself. Such physical prompts should be accompanied by either demonstrations, instructions, or both. Physical guidance can then be gradually faded while the demonstration or instructions remain. Slowly, instructions alone should come to bring about the response. Ultimately, instructions are also faded.

   A study by Striefel, Bryan, and Aiken (1974) illustrates the transfer of stimulus control from guidance to verbal prompts. Initially, clients were physically guided to imitate a series of movements. During the transfer phase, a verbal instruction was given immediately before a behavior was modeled. Correct responses were followed by increasing the time between the verbal instruction and the modeled behavior. Eventually the clients began to "anticipate" the modeled behavior,

responding before the response was modeled. The fact that the delay between the verbal instruction and the modeled behavior was introduced gradually and that the method provided maximum opportunities for reinforcement certainly made the transfer easier.

6. Fading out demonstrations and instructions: The basic technique for fading physical prompts is also used for fading imitative demonstration and instructional prompts. Unless the client responds or starts to respond before a prompt has been fully presented, the prompt should be faded gradually. Demonstrations should consist first of the fully modeled target behavior and slowly becomes less complete, fading into more and more subtle gestures and eventually vanishing altogether. For example, Sarah's trainer in domestic maintenance skills prompts her to sweep the floor by modeling the response herself. As Sarah becomes increasingly more adept at sweeping the floor, her trainer will not fully model the behavior. Eventually, Sarah will sweep the floor when verbally prompted. Ultimately the words "sweep the floor, Sarah", a natural clue for her response, will bring about the behavior.

   A self-care skill taught by Thomas, et al. (1976) was folding clothing after it was removed from the dryer. First, the response was fully guided with accompanying instructions. Next, demonstrations were substituted for the physical guidance. Demonstrations were gradually faded; gestures (e.g., pantomimes of holding the corners) were supplied when necessary. Eventually, the gestures were not needed and gradually instructional prompts were also withdrawn. By the end of the training the clients only had to be presented with bundles of their clothes in order to fold them appropriately.

7. Shifting control from irrelevant to relevant discriminative stimuli: Some prompts are not at all relevant to the responses that they bring about. Those prompts must be faded and replaced by S^D's present in the natural environment.

   The way to accomplish the shift from irrelevant to relevant stimuli is to introduce both the irrelevant S^D and the potential S^D, toward which attention is supposed to be focused. Eventually, the irrelevant stimulus can be faded, gradually

enough so that there is enough opportunity for frequent reinforcement to continue. For example, in teaching reading, a picture may be shown with its written label below. At first, the student responds to the picture (S^D). The teacher reinforces the student with his approval and indicates that the word written below also says the same thing. Then the picture may be covered and only the letters remain exposed. Some students then begin to respond correctly to the letters, the relevant stimuli. But for many students the shift must be more gradual, and attention must be focused first on the stimulus properties. For example, the letters may be traced with finger, pencil, or crayon, or copied; the word may be matched to an identical word; or the individual letters may be sounded aloud in sequence. Eventually the work will be said in the presence of the printed word alone.

In the matching-to-sample technique fading is systematically programmed to accomplish shifts of stimulus control from irrelevant to relevant stimuli in much the same way. An S^D is presented, and the student must respond by selecting a matching stimulus from among several stimuli. The situation can be arranged so that initial responding allows for matching to the initially controlling but irrelevant stimulus, and slowly shifts to the relevant stimulus.

Matching-to-sample and other similar procedures for fading stimulus control can be designed so precisely that almost no errors are allowed to occur. These procedures allow for errorless learning. A relevant stimulus can be gradually introduced while the irrelevant one is faded.

Procedures for shifting control from irrelevant to relevant properties must be used with caution, however. Unless the client's attention is under the control of the critical or relevant property of the stimulus during training, transfer of control will not occur. It is important that the irrelevant stimulus doesn't prevent the client from orienting toward the relevant stimulus. The client might be attending to some extraneous property, rather than to the critical property. In that case, the rate of responding in the presence of the relevant stimulus would decrease rapidly when the irrelevant stimulus was no longer present (Anderson, 1967; Terrace, 1966).

8. Correcting errors. When an individual is required to keep trying to answer a question, solve a problem, or emit any other behavior until it is correct, a correction procedure is in operation. Research has shown that providing an individual with information about the appropriateness of his or her responses plus, active correction of the error will make the development of stimulus control easier, especially when the goal is to develop complex forms of stimulus control (Suppes and Ginsburg, 1962; Holland and Porter, 1961; Moore and Goldiamond, 1964). Correction procedures have also included going back to earlier steps in the instructional procedure. (Sidman and Stoddard, 1967) and branching out to additional steps (Markle, 1969) when the individual makes repeated errors or makes additional errors during attempted correction.

   Some clients will find it difficult to understand language; words like "right" and "wrong" are simply not very effective. Thus, failing to say "right" does not function as an extrinction procedure, and saying "wrong" does not act as punishment. Such clients may have delayed or impaired language development or hearing impairments. With such clients, any response from others may constitute "attention" - not only the comment, "wrong", but also present the trial again. To prevent the unintended reinforcement of incorrect responses in such instances, each wrong response should be indicated by a word or gesture, then the next level of prompt should be given, or a pause should follow before a correction procedure is introduced. It is important that a client learns when his performance is acceptable.

   When an incorrect response is made, it is usually advisable for the client to practice the correct response several times before a new trial is presented. This is done in order to provide the client with several more reinforced trials and to experience success before proceeding. In addition, requiring time and effort may render the practice slightly aversive, and reduce the likelihood that the error will be repeated.

Using fading with shaping

Discriminative stimuli (e.g., directions, modeled behavior, gestures, and other prompts) are often used in shaping. The shaping procedure can be facilitated by bringing about

approximations through the presentation of appropriate S^D's. However, it it often a good idea to remove those S^D's before a new step in the shaping procedure is initiated. This is especially important if acquisition of approximations toward the terminal goal are to be firmly incorporated into the client's repertoire.

Fading and shaping procedures are often combined in the development of instructional materials. Instructors often find that when fading is used, the student makes fewer errors than he would if he were required to progress without assistance. Since errors are likely to occur in the first place, they are less likely to be recalled or to recur.

Skinner's and Krakower's (1968) "Write and See" instructional handwriting program illustrates how fading can be a useful tool for educators. A similar approach was used by Taber and Glaser (1962) to teach the reading of color names. This program was used for individuals who were able to say the name of a color when it was presented to them, but were not able to read the name of the color. Taber and Glaser then presented the name of each of the colors printed in its respective color. The colored letters were gradually replaced by black ones until all the letters were black. Reinforcement occurred only when correct responses were given. What started as color naming, ended as reading names of colors.

Using fading with chaining

The S^D's that have been added to bring about the emission of each of the links of the chain must be removed before one can state that the behavioral goal has been achieved. Just as in shaping, it is obvious that a gradual fading of the intermediate prompts in a complex chain of behaviors is necessary if the goal behavior is to occur smoothly and with precision. If these S^D's are removed too abruptly, the result would probably be a break-down of the behavioral chain.

Since each prompted link in a behavioral chain occupies a sequential position, the question arises: at what link should one begin to fade S^D's? Since the link of the chain that probably has the greatest strength is the final link, it seems logical that the prompt that brings about the last link of the chain is the first one that should be removed. As that last link and the one immediately prior to it become fairly well established, the S^D for the next prior link may then be eliminated, and so on, until the entire chain is carried out with perhaps only a single S^D at the beginning of the chain, such as an instruction.

Advantages and disadvantages of using fading

The major advantage of the fading procedure appears to be that it reduces clients' errors as they learn. McCandless (1967) and Terrace (1963) state that if errors are allowed to occur during the learning of new behaviors, future errors are much more likely to occur. By keeping initial errors to a minimum, fading avoids the need for eliminating future errors and retaining correct responses. When fading is done gradually, the procedure reduces dependency upon such S^D's as directions and imitative prompts.

While keeping errors to a minimum has obvious advantages in the acquisition of a specific complex behavior, the question of whether consistent error-free responding is desirable has yet to be resolved. Discussing errorless performanance in discrimination learning, Terrace (1966) states "It should be noted. . . that numerous factors would detract from the wisdom of trying to train all discriminations without errors. Perhaps the most important of these is the lack of frustration tolerance that would result from a steady diet of errorless discrimination learning (p. 335)". Krumboltz and Krumboltz (1972) have also discussed this concern, stating that, if individuals are to persist after encountering failure, it is better not provide a mistake-free environment. To train clients to persist after failures, one should arrange for them to succeed after one failure, then after two failures, and gradually but irregularly increase the number of failure experiences followed by success.

When fading is programmed to eliminate errors, other problems may also arise. Such programming is time consuming, and may not be necessary. The client may be able to learn without errors with little or no fading. The frequency of a client's mistakes is a good indicator of whether or not a strategy for achieving the terminal goal has been programmed well enough. If the client shows signs of boredom, that is a good indication that reinforcement has been too frequent, or the steps in fading have been too small. In such cases, fading should proceed more rapidly.

Self-Test 4

1. Define and give examples of each of the following terms:

   a. fading
   b. fading for errorless learning
   c. correction procedure

2. True or False: Prompting and fading should proceed from least artificial to most artificial. Explain your answer.

3. Describe what can be done to correct clients' errors.

4. List the advantages and possible disadvantages of fading.

5. Explain how prompting, fading, and shaping fit together.

Generalization Training

Behaviors learned in a training environment may not always produce a permanent change outside that environment. This may be due to a failure of the new behavior to generalize to the client's normal environment. Desirable behavior which was learned in the training setting may be extinguished. Sometimes a schedule of reinforcement in the natural environment is not adequate for learning a response, but once the behavior is learned, the normal schedule in the environment might maintain it.

One cannot automatically assume that a newly learned behavior will generalize and be maintained in the natural environment, but appropirate procedures may frequently be followed to insure the likelihood of success.

Generalization training focuses on antecedent stimuli (i.e., what happens before the behavior occurs). Its purpose is to allow a client to perform a behavior under conditions different from those under which the behavior was originally learned (e.g., from treatment to home, from school to group home, from one task to another). Generalization indicates that a behavior learned in one situation tends to be performed in other situations. When a child performs a behavior learned at school (e.g., following instructions), at home he is said to be "generalizing the response."

The objective of generalization training is to promote generalization so that behaviors acquired or strengthened under one set of conditions are more likely to occur under other conditions. Effective programs usually require that behaviors learned in one setting be generalized to many situations in and out of that setting. For example, it is often assumed that clients in a sheltered workshop will take their newly acquired skills into actual job situations. However, it is frequently false to assume that generalization will occur spontaneously (O'Leary and Drabman, 1971). Thus, if generalization is desired, training for generalization should be carried on either during the program or after the client has met the objective of the program. Generalization should not be left to chance. The following procedures are important in generalization training.

1. Emphasizing common elements: Emphasizing common elements may help clients generalize a behavior learned in one situation to other situations. The elements that the situations share in common must be emphasized. When it is possible to identify the discriminative stimuli under which a client has first performed a behavior, as well as the

reinforcer or other stimulus consequences, it is easier to teach the client to generalize. Once these stimuli have been identified, the instructor can introduce many of them into the new situation. The two situations will then have many common elements which will enable the client to associate the occasions on which the response should occur.

Unless generalization training is programmed to accompany procedures in special settings (e.g., work activity centers; sheltered workshops), behaviors learned in these settings are not likely to be generalized to the natural environment. (Walker and Buckley, 1972; Walker, Hope, and Johnson, 1975). Sheltered workshops for developmentally disabled or emotionally impaired persons help to smooth the transition to regular vocational programs. Group homes may have similar functions for young people moving back to the community from correction facilities or for retarded citizens moving toward full community placement. In these instances, however, there are often no provisions to promote generalization, then people are dismayed when generalization does not occur.

The stimuli common to situations often act as discriminative stimuli (S^D's) and thus serve to foster generalization. Not all stimuli in a situation have controlling properties or act as S^D's. Generalization is easier to bring about when the S^D's occur across situations. When common antecedent-stimulus elements are introduced and generalization does not occur, it is safe to say that the appropriate S^D has not been identified; others will have to be tried. Some individuals (particularly autistic persons) do not respond to "appropriate" cues or are "microselective" which makes it difficult to attain stimulus control.

2. Changing to intermittent reinforcement: When a behavior is well established under specific stimulus conditions, shifting to intermittent reinforcement before generalization training may have two purposes: first, to promote maintenance in that setting and, second, to facilitate generalization. Regarding the facilitation of generalization, it has been suggested that behaviors that are intermittently reinforced will generalize more effectively than those that are continuously reinforced (Koegel, 1975).

3. Training the response under a variety of conditions. Generalization is more likely to occur when the behavior is taught under a variety of stimulus conditions. Stokes, Baer, and Jackson (1974) used several instructors in multiple settings when teaching hand waving to four institutionalized ten-to-thirteen-year-old retarded clients. For three of the clients, this response or greeting was generalized to other staff members only after training was carried out in a variety of settings (playroom, hall, and playground) from more than one trainer. Gradually, training by two or three instructors in several different settings seems to be necessary if generalization is to occur across settings (Garcia, 1974; Stokes, Baer, and Jackson, 1974).

4. Adding S^D's and changing reinforcement conditions: Often it is helpful to combine natural and additional stimuli like instructions or gestures that have been noted to have discriminative control over some of the client's other behaviors. Such additional stimuli can be used in the original training situation and shifted to the new situation with the client, or they may be introduced in the new situation. For example, requests from parents, supervisors, instructors, aides, etc. may cue the behavior. For the transition to the new situation to be complete, however, the additional S^D's must eventually be faded.

   The selection and use of reinforcers is important in order to facilitate generalization. The instructor should move away from artificial reinforcing contingencies. For example, each of the characteristics that influence the effectiveness of a reinforcer-what kind, how much, how soon, how frequent, and possibly other questions- should be examined to determine whether or not any depart substantially from the way in which the reinforcer is arranged in the natural environment. If the characteristics of reinforcement deviate greatly, the program must include a plan for phasing back to natural consequences. Natural reinforcers must be substituted for artificial reinforcers. (e.g., reinforcers unnatural to the situation.) Reinforcement should also be progressively diminished until its frequency is similar to what occurs in the natural situation. For example, <u>delay of reinforcement</u> can be introduced to a

client who has been receiving tokens on completion of each individual task. Instead of continuing this procedure, the tokens are saved for him and presented at the end of each session for a few weeks, then at the end of each week (similar to the pay schedule he will encounter in a work setting). It is important to keep data so that the instructor will have continuous information on the adequacy of the program. A serious deterioration in behavior would indicate the delay of reinforcement has been introduced too abruptly and that the programmer should back up a step or two before reintroducing more gradual progressions in delay.

The amount of reinforcers delivered during programs employing optimal reinforcing contingencies may often be much more than are present in the natural environment. A fairly large amount of reinforcement may be necessary to support initially high rates of responding when a behavior is being learned. However, after a while, it should be possible and is advisable that the amount of reinforcement be gradually reduced to what is available in the natural environment.

Self-Test 5

1. Define and give an example of generalization training.

2. List and discuss the factors that promote generalization.

3. Based on generalization training, make an argument against the use of separate classrooms for the "educationally handicapped". Be specific and complete in your argument.

4. Describe how you might use the principle of emphasizing common elements (used in generalization training) to prepare a group of clients for a trip to the state fair.

5. Which two clients have the highest probability of maintaing on-task behavior in the workshop setting? Explain your answer:

   Four clients were removed from the workshop setting and placed in a special classroom because of their high rate of disruptive behavior. All four were then given tokens for every ten minutes that they remained on-task. They had to earn one token to receive a ten-minute coffee break. All four clients' on-task behaviors increased. Two of the clients were then required to earn three tokens, then four, etc. before getting a coffee break. The other two continued having a coffee break after earning one token. After three weeks all four continued with high rates of on-task behavior.

Discriminative training

In order for us to make any sense out of our world, we must learn to recognize certain objects and events. In order to do this, we learn to select certain features of objects and events that make them different from other objects or events. This type of selection is called discrimination. An example of discrimination is being able to tell a cat from a giraffe on the basis of its size, shape, length of neck, and perhaps the sound it makes. The features of a cat and a giraffe have in common such as four legs, a tail, ears, mouth, eyes, etc., are ignored when making a discrimination.

Most people are born with some power to make discriminations. For example, research has shown that even newborn babies will look longer at face-shaped patterns than at any other type of pattern. This indicates that they are able to discriminate. Discrimination is further learned as some objects or events are consistently associated with either pleasant or unpleasant states. When a baby is still very young, he becomes able to discriminate his parents' touch, voice, and appearance from those of a stranger. This is generally because his parents have been closely associated with reducing unpleasant states (e.g., hungry, wet, cold) and producing comfort (e.g., full, dry, warm). This process of discrimination speeds up when the individual develops language skills and learns to label different things with different names.

Normal persons quickly learn to independently select the relevant features of an object or event. Unfortunately, many retarded individuals have a difficult time selecting the important features of an object or event. In order to successfully teach persons who have a difficult time making discriminations, the instructor must learn how to arrange materials, tasks, and cues to draw the student's attention to the relevant features and then know how to fade the extra help so that the student can learn to perform the task as independently as possible.

All learning requires that the individual detect some differences in what he sees, hears, or touches. Therefore, in learning to recognize shapes, an individual must learn to discriminate differences in the curvature of a line to be able to tell round from square. Similarly, some aspects, such as color and size, of the objects used to teach shapes must be ignored. Similarly, in the social setting, the individual learns to attend to certain physical characteristics such as facial features to discriminate instructors from clients. Again, some features such as clothing must be ignored (e.g., suppose another client was

dressed identically to the instructor).

The features which must be attended to in order to make the discrimination are called relevant dimensions. The features which should be ignored are called irrelevant dimensions.

Zeaman and House (1963) feel that solving a discrimination consists of learning a chain of two responses. First, an individual must learn to attend to the relevant dimension between the stimuli and then he must choose the stimulus that is correct. A dimension is a characteristic. For example, the various colors (red, blue, green, etc.) make up the size dimension. To make learning about things easier and more efficient, the student needs to organize the material into groups (e.g., red things, round things, things found in the kitchen). This produces at least two major effects. First, it allows the individual to focus on the critical features by directing his attention to what is relevant. It also allows the student to learn that, as well as the particular shapes round and square being distinct, shape is a dimension on which things in the world vary. As he works with materials, the individual learns that one way to sort them is in terms of their shape. Another way to sort them is in terms of their color or size. The individual, when making a discrimination, must learn to attend to the dimension on which things differ as well as, and often before, he can observe differences between particular stimuli within those dimensions.

When an individual learns one shape discrimination (e.g., round and square), and subsequently is taught another shape discrimination (e.g., round and triangular), his learning of the second problem is generally much faster than the first. In learning the first discrimination, he learns both that shape is a relevant dimension, and which particular shape is correct. In learning the second problem, since the person is already attending to the shape dimension, he only has to learn to choose which of the new shapes is correct.

Trial and error discrimination

One way an instructor could teach an individual to make discriminations is to reinforce him to correct responses to a given cue. This is referred to as the trial-and-error method of teaching discrimination. In other words, if a work supervisor wanted to teach the difference between a hammer and a screwdriver, he might place both the hammer and screwdriver in front of the client. he can then say, "Show me the hammer" and reinforce the client for pointing to the hammer. If this is continued long enough, the client would probably learn the discrimination, since a hammer and a screwdriver are quite different. However, trial-and-error

discrimination learning would take a very long time if you were trying to teach a client the difference between a Phillips screwdriver and another type, and continued failure could easily occur. If an individual continuously fails at a task, he may cease to attend to any of the relevant dues in the learning situation. Thus, when the trainer makes some change in the task to make it easier for the client, it often makes no difference. The client is no longer oriented to the task and does not deserve the change. Therefore, techniques other than trial-and-error learning are usually used to speed up discrimination learning.

Errorless discrimination training using fading of irrelevant stimuli

Trial and error learning can be time consuming. For this reason, attempts have been made to devise more efficient methods of establishing a discrimination. One method involves the use of redundant stimuli which are systematically faded (Gold, 1968). Sometimes a discrimination can be learned in various ways. An example would be the discrimination between a yellow circle and a green square (the correct choice). A perfect solution could be achieved by selecting the square object without looking at its color. Or, a perfect solution could be given by selecting the green object while ignoring the shape. When two dimensions of stimuli always appear together, they are said to be redundant. An important aspect of redundance is that learning occurs more rapidly with a greater number of redundant relevant dimensions. The more cues an individual has to help solve a problem, the faster he will generally solve it. An individual will generally learn to pick the large, red circle more quickly than simply picking a circle. Having three relevant and redundant dimensions is likely to make the task easier. Gradually through the course of training the redundant dimensions are faded until the individual is selecting an item on the specific dimension desired to be trained (e.g., shape).

Easy-to-hard sequence

A sequence of easy-to-hard problems generally takes less time to learn than learning the hard problem alone (House and Zeaman, 1960; Zeaman and House, 1963). For example, if you want a client to sort a pile of two different length bolts where the difference was 1/4 inch, he would generally learn it faster if he started by sorting bolts where the difference in length was one inch, then moved to those with 1/2 inch difference, then to the 1/4 inch difference. Initially, exaggerating the difference of the relevant dimension, helps the client identify the relevant dimension. When the differences get smaller, the individual

will already be attending to the relevant dimension which will greatly increase his chances of making the correct choices. It is much more difficult for a client to learn to attend to a dimension where the differences are small to begin with (Shepp and Zeaman, 1966).

Novelty

Most instructors are well aware of the attention-attracting features of a novel object or event. Individuals who have been unresponsive will attend to the task if a novel stimulus is suddenly introduced. For example, putting a bell and a shoe in front of the individual who has been having problems with a shoe vs. sock discrimination (where shoe is the correct response) may gain the client's attention and allow him some success. Don't use the same novel stimulus over and over or it will no longer act as an attention-getter.

Errorless discrimination training using delay of prompts

When using this technique, two or three items are placed before the client. He is asked to choose a certain one. The client (before he responds) is immediately given a prompt (such as the instructor pointing to the correct item) and the client then makes a response. When he responds with no errors for a given number of trials, the prompt is then delayed for a second or two. The prompt is delayed for increasingly longer periods of time until the client's response occurs before the prompt. In this procedure the client is reinforced for making a prompted correct response as well as for making an independent correct response. Thus, the client learns a discrimination with virtually no errors if the delay of the prompt is properly programmed.

Meaningfulness

Meaningfulness refers to what an item or event means to a client. If an item or event is meaningful to a client, he is likely to learn the discrimination. Thus, it would probably be easier to teach the difference between a glass and a book, if correct responses to the glass were always paired with a sip of the client's favorite beverage from that glass. Likewise, a discrimination of a hat from other items might proceed faster if the discrimination is included in the task of putting on the hat (i.e., put a ball and a hat before the client, and say, "Show me the hat". When the client selects the hat, go through the program for putting the hat on). Color discriminations can be taught by using favorite foods (e.g., candies) or other favorite items of the client as the color to be learned and less favored stimuli as the item of another color.

Match-to-sample

A match-to-sample technique involves presenting an object (stimulus) and having the client select from a group of objects (response choices) the one that matches. A match-to-sample procedure can include the use of other techniques such as redundancy, easy-to-hard sequence, novelty, fading, and prompting.

Selecting the "different" item from a group

This type of discrimination training involves placing three or four objects in front of the client. All but one of them are the same. The client is to choose from one which is different. The ways in which the stimuli are the same or different can be one or a number of dimensions. For example, if you are teaching the concept of male-female, you might begin by presenting the client with two girl dolls and a picture of a boy. After he learns to select the different stimulus, all pictures might be presented. Later, the similar pictures need not be identical, but be able to generalize that males may not always look exactly alike, but are still not females.

Self-Test 6

1. Give an example of the discrimination training procedure based on trial and error.

2. Discuss how redundancy, relevant and irrelevant cues, and the easy-to-hard sequence are used in discrimination training.

3. Describe the match-to-sample technique as used in discrimination training.

Read the following two programs and, for each, choose the discrimination technique used from the following list.

a. trial and error
b. fading of irrelevant stimuli
c. easy-to-hard sequence
d. novelty
e. delay of prompts
f. meaningfulness
g. match-to-sample
h. selecting the "different" item from a group

4. Purpose: When the instructor holds up an item and says "Show me one like this," the client will point to the matching object (in an array of three) nine out of 10 times.
Materials: ball, shoe, and cup (two of each)
Training method:

a. Place the three objects in front of the client.
b. Hold up an object identical to one in the client's array and say, "Show me the one like this".
c. Reinforce the client for touching the correct objects.
d. Use three step prompting (gesture, model, guidance) if the client does not the correct item.

Self-Test 6 (Cont'd.)

5. Purpose: Given the command, "Show me the fork," the client will touch the fork nine out of ten times.
Materials: A drinking glass and a fork.
Training method:

a. Place the objects in front of the client
b. Say, "Show me the fork" (cue)
c. Wait one second
d. Say, "This is the fork" and point to the fork (prompt)
e. Score a correct response and reinforce if the student touches the fork either before or after the prompt.
f. If the client does not touch the fork, physically guide him and score as incorrect.
g. When the client has achieved 90% accuracy for 3 consecutive sessions, wait 3 seconds after the cue before giving the prompt.
h. When the client achieves criterion at 3 seconds, wait 5 seconds, etc. Discontinue program when client gives 90% correct responses before the prompt.

NOTE:

Much of the material for this module has been adapted from the three books suggested under "Primary Reading". In addition, material was adapted from: Holvoet, J., Tucker, D.J., and Horner, R.D. Generalization and discrimination of operant behavior. Topeka, Kansas: Personnel Training Program for Teaching Associates of the Severely Handicapped. The Kansas Neurological Institute, 1976

PROJECTS

To be completed with clients with whom you are presently working.

1. Select a client. Select an instructional objective that is not a part of his/her repertoire (be sure it is included in the IPP). Prepare a program to teach the objective. In your program, include several steps, each of which more closely approximates the objective. Include fading procedures as part of the material for teaching each approximation. Try the program with your client. Record the number of correct and incorrect responses at each step. By referring to the data which you have collected, evaluate your shaping and fading procedures.

2. Select a terminal goal consisting of at least a five-link chain, and a client who does not have several of its links in his/her repertoire. Incorporate shaping, fading, and chaining procedures to teach the complex behavior. Record your data including the number of correct and incorrect trials for each segment and for each combination of segments. Evaluate the effectiveness of your chaining and fading procedures.

Reading List

Primary Readings:

Sulzer, B., & Mayer, G. R. Behavior modification procedures for school personnel. Hinsdale, Illinois: The Dryden Press, Inc., 1972.

Sulzer-Azaroff, B., & Mayer, G. R. Applying behavior analysis procedures with children and youth. New York: Holt, Rinehart, and Winston, 1977.

Whaley, D. L., & Malott, R. W. Elementary principles of behavior. New York: Appleton-Century Crofts, 1971.

Supplementary Readings:

Baer, D. M., Peterson, R. F., & Syherman, J. A. The development of imitation by reinforcing behavioral similarity to a model. Journal of Experimental Analysis of Behavior, 1967, 10, 405-416.

Becker, W. C., Engelmann, S., & Thomas, D. R. Teaching 2: Cognitive learning and instruction. Chicago: Science Research Associates, 1975.

Foxx, R. M., & Azrin, N. H. Restitution: A method of eliminating aggressive-disruptive behavior of retarded and brain damaged patients. Behavior Research and Therapy, 1972, 10, 15-27

Garcia, E. The training and generalization of a conversational speech form in nonverbal retardates. Journal of Applied Behavior Analysis, 1974, 7, 137-149.

Gold, M. Classroom techniques: Preworkshop skills for the trainable: A sequential technique. Education and Training of the Mentally Retarded, 1968, 3, 31-37.

Gold, M. W., & Scott, K. G. Discrimination learning. In W. B. Stephens (Ed.), Training the developmentally young. New York: John Day, 1971, 420-444.

Gustafson, C., Hotte, E., & Carsky, M. Everyday living skills. Unpublished manuscript, Mansfield Training School, Mansfield Depot, Connecticut, 1976.

Reading List (cont'd).

Holland, J. G., & Porter, D. The influence of repetition of incorrectly answered items in a teaching machine program. Journal of the Experimental Analysis of Behavior, 1961, 4, 305-307.

House, B., & Zeaman, D. Transfer of a discrimination from objects to patterns. Journal of Experimental Psychology, 1960, 59, 298-302.

Kazdin, A. E. Behavior modification in applied settings. Homewood, Illinois: The Dorsey Press, 1975, 212-228.

Koegel, R. L. The generalization and maintenance of treatment gains. Paper presented at the Association for Advancement of Behavior Therapy, San Francisco, December, 1975.

Krumboltz, J. D. & Krumboltz, H. B. Changing children's behavior. Englewood Cliffs, New Jersey: Prentice-Hall, 1972.

Markle, S. M. Good frames and bad. New York: Wiley, 1969

McCandless, B. R. Children: Behavior and development. Hinsdale, Illinois: Dryden Press, 1967.

McDowell, E. E. A programmed method of reading instructions for use with kindergarten children. Psychological Record, 1968, 18, 233-239.

McReynolds, W. T. A procedure for the withdrawal of an infant oral pacifier. Journal of Applied Behavior Analysis. 1972, 5, 65-66.

Moore, R., & Goldiamond, I. Errorless establishment of visual discrimination using fading procedures. Journal of the Experimental Analysis of Behavior, 1964, 269-272.

O'Brien, F., Azrin, N. H., & Bugle, C. Training profoundly retarded children to stop crawling. Journal of Applied Behavior Analysis. 1972, 2, 131-137.

O'Leary, K. D., & Drabman, R. Token reinforcement programs in the classroom: An overview. Psychological Bulletin, 1971, 75, 379-398.

Reading List (cont'd.)

Shepp, B., & Zeaman, D. Discrimination learning of size and brightness by retardates. Journal of Comparative and Physiological Psychology, 1966, 62, 55-59.

Sidman, M., & Stoddard, L. T. The effectiveness of fading in programming a simultaneous form discrimination for retarded children. Journal of the Experimental Analysis of Behavior, 1967, 10, 3-16

Skinner, B. F. Teaching machines. Science, 1958, 128, 969-977.

Skinner, B. F., & Krakower, S. A. Handwriting with write and see. Chicago: Lyons & Carnahan, 1968.

Stokes, T. F., Baer, D. M., & Jackson, R. L. Programming the generalization of a greeting response in four retarded children. Journal of Applied Behavior Analysis. 1974, 7, 599-610.

Striefel, S., Bryan, K. S., & Aikins, D. A. Transfer of stimulus control from motor to verbal stimuli. Journal of Applied Behavior Analysis. 1974, 7, 123-135.

Suppes, P., & Ginsburg, R. Application of a stimulus sampling model to children's concept formation with and without overt correction responses. Journal of Experimental Psychology, 1962, 63, 330-336.

Taber, J. I., & Glaser, R. An exploratory evaluation of a discriminative transfer learning program using literal prompts. Journal of Educational Research, 1962, 55, 508-512.

Terrace, H. S. Discriminative learning with and without errors. Journal of Experimental Analysis of Behavior, 1963, 6, 1-27.

Terrace, H. S. Stimulus control. In W. K. Honig (Ed.), Operant behavior: Areas of research and application. New York: Appleton, 1966. 271-344.

Thomas, C., Sulzer-Azaroff, B., Lukeris, S., & Palmer, M. Teaching daily self-help skills for long term maintenance. In B. Etzel, J. LeBlanc & D. Baer (Eds.), New developments in behavioral research: Theory, methods, and application. Hillsdale, New Jersey: Erlbaum, 1976.

Reading List (cont'd.)

Touchette, P. E. The effects of graduated stimulus change on the acquisition of a simple discrimination in severely retarded boys. Journal of Experimental Analysis of Behavior 1968, 11, 39-48.

Walker, H. M., & Buckley, N. K. Programming generalization and maintenance of treatment effects across time and across settings. Journal of Applied Behavior Analysis. 1972, 5, 209-224.

Walker, H. M., Hops, H., & Johnson, S. M. Generalization and maintenance of classroom treatment effects. Behavior Therapy, 1975, 6, 188-200.

Zeaman, D., & House, B. The role of attention in retardate discrimination learning. In N. R. Ellis (Ed.), Handbook of mental deficiency. New York: McGraw-Hill, 1963, 159-223.

INSTRUCTIONAL SUPPLEMENT PACKET

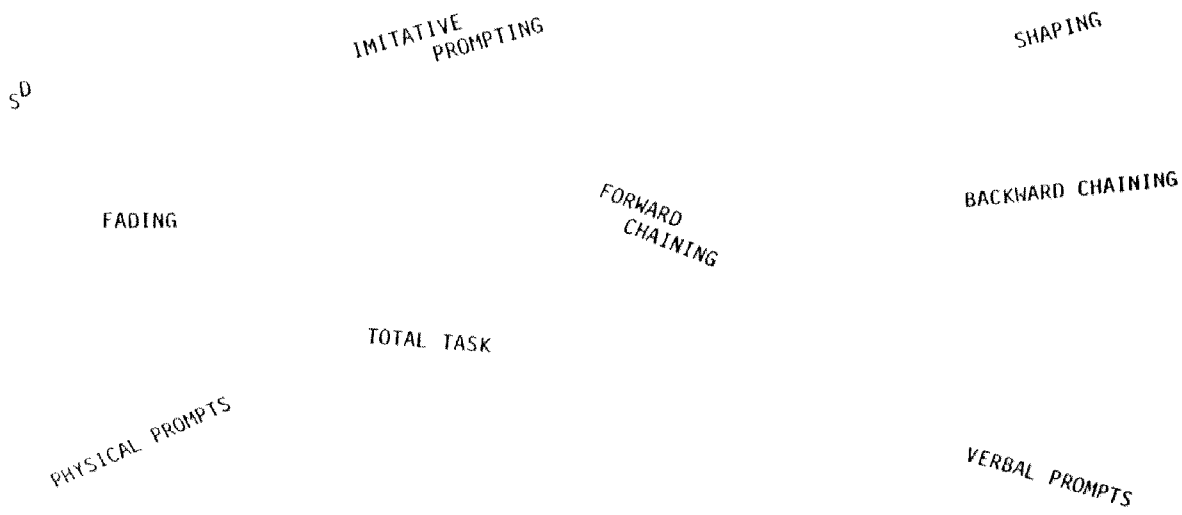
This packet of information is designed to assist the staff person in the study of this module. Two sets of information are provided:

> Teaching New Behaviors Outline: This provides an organized summary of the critical information contained in the module and references the pages in the module where further information is provided. Staff persons should review this outline before completing the rest of the module. Knowledge of the information in this outline will provide the staff person with the basics for teaching new behaviors. Critical terms are contained on the cover sheet. Staff persons should circle these as they feel they develop an understanding of them. Those not circled will be discussed further by the instructor.

Testing of staff performance will be based on the information found on this packet, as expanded upon in the rest of the module. Staff should become familiar with the information provided on the outline.

TEACHING NEW BEHAVIORS

OUTLINE



TEACHING NEW BEHAVIORS
(Basic Techniques)

1. USE DISCRIMINATIVE STIMULI (S^Ds) TO BRING ABOUT APPROPRIATE RESPONSES

-- A discriminative stimulus (S^D) cues a response to be made that is likely to be reinforced (thus an appropriate response for a new behavior). Discriminative stimuli to be used include:

   a. Verbal prompts/instructions -- verbally instruct the client in doing the appropriate response.

   b. Imitative prompting -- model the appropriate response so the client can imitate it.

   c. Physical prompting -- physically guide the client in making the appropriate response.

All are discriminative stimuli which lead to appropriate responses in a client in learning a new behavior. They are "irrelevant" in that they are not normally needed, but we use them at first to get as much "power" as possible in bringing about appropriate responses. We do not want to use more than is needed, but want to use enough power to bring about the response. Normally, we try verbal prompts, then imitative prompting if needed, and finally physical prompts if needed (and/or a combination thereof).

2. ONCE RESPONSES ARE BEING MADE, USE FADING TO REMOVE IRRELEVANT DISCRIMINATIVE STIMULI WHILE MAINTAINING THE RESPONSES TO RELEVANT STIMULI

-- Fading is the process of gradually removing the irrelevant discriminative stimuli so that the client is responding to more natural and relevant discriminative stimuli. You would sequentially fade out:

   a. Physical prompts

   b. Then imitative prompting

   c. Then verbal prompts/instructions

The idea in fading is to gradually eliminate the irrelevant discriminative stimuli that were initially needed in bringing about the response. Physical prompts are normally faded out quickly to eliminate over-dependence.

TEACHING NEW BEHAVIORS
(Broader Strategies)

As described under "BASIC TECHNIQUES" on the preceding page, discriminative stimuli such as verbal, imitative, and physical prompting can be used to bring about appropriate responses, and then fading can be used to remove irrelevant discriminative stimuli while maintaining the responses. Additionally, broader training strategies include:

1. SHAPING — Specific responses can be trained by gradually working towards them; by shaping them. You begin with a response the client is making which vaguely resembles the terminal response, and reinforce the client for making that response, then a response a little more like the terminal response, and then others a little closer to the terminal response, until you finally "shape" the client into making the terminal response:

   a. Keep the terminal response in mind

   b. Find a starting point
      - You may use S^Ds in bringing about each step as described earlier

   c. Set up a series of steps
      - These can be gradually faded out at each step as it is acquired

   d. Carry out the shaping procedure

2. CHAINING — Once simple responses exist (or approximations thereof), more complex responses and behaviors can be trained by using a chaining strategy. Each simple response or component of the more complex task is one link in the chain--and they are arranged in appropriate order and trained by:

   a. Forward chaining -- Training just the first step, then adding on the second, then the third, etc.

   b. Backward chaining -- Training just the last step, then adding on the next to last, then third to last, etc.

   c. Total task (chain) -- Train all components of the chain concurrently.

Again, additional S^Ds can be used at various components of the chain and then faded out, and shaping can be used for components of the chain.

TEACHING NEW BEHAVIORS
(Additional Strategies)

1. DISCRIMINATION TRAINING — Quite often, clients may not be able to accurately discriminate relevant stimuli, or may be responding to inappropriate discriminative stimuli. This compromises the utility of many of the preceding strategies. Discrimination can be trained in the following manners:

   a. Trial and error — Relevant and irrelevant stimuli are concurrently presented to the client and the client is reinforced each time he picks the correct one.

   b. Fading of Redundant Stimuli — Additional but redundant stimuli can be used to simplify the discrimination, and then these can be gradually faded out.

   c. Easy-to-Hard Sequence — Start with very obvious discriminations and gradually make them more exacting (shaping).

   d. Delay of Prompts — Prompt the client immediately on the discrimination, then delay the prompt for one second, then for five seconds, etc., until the prompting is not needed.

   e. Matching-to-Sample — Provide a separate sample of the appropriate stimulus and then gradually fade this out.

   f. Oddity — Make the relevant S^D the only odd one in a group and have the client pick it out. Gradually reduce the degree to which the other S^Ds are different.

2. IMITATION TRAINING — As an additional S^D in training clients, modelled responses can be imitated by the clients. Where client imitative behavior does not occur, it can be trained. Sessions can be arranged where the client can be reinforced for imitating trainer responses. Verbal and physical prompting and shaping can be used.

3. GENERALIZATION TRAINING — Behaviors developed in a training environment (e.g. work behaviors) are useless unless the client generalizes and uses them in other appropriate settings (e.g. competitive employment). To facilitate generalization, the following should occur in training:

a. Emphasize common elements and S^Ds of more natural situations.

b. Change reinforcement to appropriate intermittent reinforcement schedule.

c. Train responses under a variety of conditions.

d. Specific S^Ds may be added and transferred to new situations.

4. "POLISHING" RESPONSES — Once appropriate responses occur--they may be polished via response differentiation. Groups of responses which have at least one characteristic in common are known as response classes (e.g. a variety of correct and incorrect golf swings). In response differentiation, we want the client to emit the specific and exact characteristics of the task. Thus, we use differential reinforcement: we reinforce only one member of the response class and ignore the others. In this way, the reinforced response becomes differentiated and occurs more often than the other behaviors in the response class which are not reinforced.